IMPERIAL MYCOLOGICAL INSTITUTE

REVIEW

OF

APPLIED MYCOLOGY

VOL. XII DECEMBER 1933

R. (H.). **Comment on combat la maladie de l'Orme en Hollande.** [How Elm disease is fought in Holland.]—*Bull. Soc. Centr. Forest. Belgique*, xl, 5, pp. 213–215, 1933.

In this account of the Dutch measures against the elm disease caused by *Graphium* [*Ceratostomella*] *ulmi* [*R.A.M.*, xii, p. 734], it is stated that by Royal Decrees of 18th April, 1930, and 28th March, 1931, the Dutch forestry and phytopathological services are empowered to search for elms affected by it and to decide, as far as possible with the consent of the grower, which trees must be cut down. The proprietor is then notified officially that the trees are to be removed by a certain date and in accordance with certain conditions. The fulfilment of these requirements is supervised by the local burgomaster, who in cases of non-compliance issues a summons and, if necessary, causes the prescribed measures to be effected at the owner's expense. After removal, the trees must either be barked at once or kept in water for three months to prevent further dissemination by the bark *Scolytus* beetles. Under these regulations over 26,000 elms were cut down in 1931.

All research work on the disease is controlled and directed by a Government Commission working in collaboration with the Willie Commelin Scholten phytopathological laboratory and the Wageningen entomological station [ibid., xii, p. 541].

The paper concludes with brief details of the large-scale resistance trials of elm species and varieties at present in progress in Holland [ibid., xii, p. 665].

TUBEUF [C. v.]. **Studien über Symbiose und Disposition für Parasitenbefall sowie über Vererbung pathologischer Eigenschaften unserer Holzpflanzen. II. Dispositionsfragen für den Befall der Bäume durch Pilze und Käfer. III. Untersuchungen über Zuwachsgang, Wassergehalt, Holzqualität, Erkrankung und Entwertung geharzter Fichten.** [Studies on symbiosis and tendency to parasitic infection and on the inheritance of pathological characters in our woody plants. II. Questions on the liability of trees to fungus and beetle attack. III. Investigations on incremental growth, water content, wood quality, disease, and degeneration of Spruces

denuded of resin.]—*Zeitschr. für Pflanzenkrankh. u. Pflanzenschutz*, xliii, 6, pp. 257–357; 7, pp. 369–417, 27 figs., 2 diags., 1933.

The conclusion reached by the writer, as the result of exhaustive and fully documented and tabulated studies on the connexion between the extraction of resin from conifers and infection by wood-destroying fungi, e.g., *Fomes annosus* on spruce and blue rot [*Ceratostomella* spp.] on pine [*R.A.M.*, xii, pp. 344, 345, 543, 545] in Germany, is that invasion by the pathogens is greatly favoured by this operation. The water-conducting sapwood dries out below the fissures made in the cortex for the extraction of the resin, and heavy losses of economically valuable timber from fungal attack ensue.

The remainder of the paper deals mainly with the conditions predisposing to insect attack.

HOPFFGARTEN (E. H. v.). **Beiträge zur Kenntnis der Stockfäule (Trametes radiciperda).** [Contributions to the knowledge of the butt rot (*Trametes radiciperda*).]—*Phytopath. Zeitschr.*, vi, 1, pp. 1–48, 6 figs., 1 diag., 1933.

A comprehensive account is given of the writer's detailed laboratory and field studies on the butt or red rot of spruce and pine in Germany caused by *Trametes radiciperda*, a name preferred by the author to the more commonly used *Fomes annosus* [see preceding abstract], because the fungus described under the name *Polyporus annosus* in Fries's 'Epicrisis' in 1838 appears to be quite distinct from Hartig's *T. radiciperda* and the latter is regarded as a good *Trametes*. Gaps in the stands were found to occur chiefly in soils with a P_H range of 4·6 to 6, i.e., near the optimum reaction for the growth of the fungus. By culturing the fungus on wood blocks from different situations, a connexion was traced between its occurrence and the abundant nitrogen content of reafforested arable land, which induces a loose, spongy texture in the wood and affords plentiful nutriment for the mycelium. Culture experiments further showed the necessity of a high moisture content in the wood for the optimum development of *F. annosus*, this requirement being also met on the reafforested arable areas. Nitrogen compounds of high molecular weight were particularly well utilized by the mycelium.

A consideration of the physical structure of the soil gives a clue to the apparently erratic incidence of *F. annosus* on grassland, an essential condition being the finely granulated texture characteristic of loess and loess-clay soils, in which the density leads to the death of the roots at a depth of 20 to 30 cm. and so facilitates infection. Other factors involved in the development of the fungus are the shape of the soil particles, and the ground water and subsoil conditions, so that even on soils of appropriate texture the incidence of attack may be very unequal. Permanently moist sites are not invaded by reason of the absence of aeration, but infection is prevalent on temporarily damp areas.

No exact information is available with regard to the mode of spread of the fungus in the soil, though root contact, especially at a depth of 8 to 12 inches, undoubtedly plays a part. It is ques-

tionable whether absolutely sound roots can be penetrated by *F. annosus*, the inference being rather that infection spreads from the deeper roots to the butt and to the root system in the upper soil layers, already weakened by an unsuitable environment. No evidence of wound infection by spores could be obtained and in most of the isolations from wounded areas on the roots examined, other fungi than *F. annosus* were obtained. Red rot following wounds appears to be mostly due to *Polyporus borealis* [*R.A.M.*, iii, p. 491; v, p. 267] and other wound parasites.

The author's observations did not indicate that in the areas concerned *F. annosus* was a secondary infection to that caused by *Agaricus melleus* [*Armillaria mellea*: ibid., x, p. 354].

DETWILER (S. B.). **General aspects of the White Pine situation.**—*Journ. of Forestry*, xxxi, 5, pp. 514–521, 1933.

In connexion with a general survey of the white pine (*Pinus monticola*, *P. strobus*, *P. lambertiana*, *P. flexilis*, *P. strobiformis*, *P. albicaulis*, *P. aristata*, and *P. balfouriana*) situation in the United States, the writer (representing the Society of American Foresters) emphasizes Federal responsibility for the protection of the 20,000,000 acres occupied by forests of these trees from blister rust [*Cronartium ribicola*: *R.A.M.*, xii, p. 604]. The fungus was first found established in the native pine stands of New England in 1915, and by 1932 at least 15,000,000 acres of forest had been attacked, of which 6,000,000 were receiving protection in the shape of *Ribes* eradication. From 1918 to 1931, a total of 115,897,609 *Ribes* bushes were destroyed at a cost of 83 cents per acre, of which 17 per cent. was provided out of Federal funds.

MACTAVISH (Miss J.). **Wood-destroying fungi: a biological study of dry rot (Merulius lacrymans).**—*Journ. Roy. Techn. Coll.*, Glasgow, iii, 1, pp. 191–199, 12 figs., 1933.

A study was made of the life-history of the dry rot fungus (*Merulius lacrymans*) [*R.A.M.*, xii, pp. 258–260], and descriptions are given of the external and microscopic characters of the various phases of the organism, which was successfully cultured on different artificial media and on sterile wood. The conditions favouring growth occur, especially, in structural timber adjoining the exterior walls of buildings. The organism was found to be actively water-absorbent and capable of conducting water from one place to another, and in ill-ventilated places with stagnant air the atmosphere quickly becomes damp owing to the moisture exuded from the surface mycelium.

WIERTELAK (J.). **The effect of decay caused by white rot fungi on the chemical composition of wood.**—*Bull. Internat. Acad. Polonaise, 1932*, B, 1, pp. 19–36, 1932. [Abs. in *Chem. Abstracts*, xxvii, 16, p. 3973, 1933.]

A sample of naturally decayed Douglas fir [*Pseudotsuga taxifolia*] wood infected by *Trametes pini* showed a decrease in the percentage lignin content from 29·9 to 22·4, accompanied by an increase in cellulose from 52·2 to 60, compared with the non-infected portion of the same board [*R.A.M.*, xii, p. 343]. Sawdust

samples from heartwood and sapwood of loblolly pine [*Pinus taeda*] and white fir [*Abies pectinata*] were inoculated with *T. pini* and *Polystictus hirsutus* [ibid., x, p. 217], the loss in weight determined, and chemical analyses made in the early stages of decay. The maximum loss in weight (15·3 per cent.) was obtained with *P. taeda* sapwood infected by *T. pini*. In general, the white rot decay results in a marked decrease of lignin coinciding with a slow consumption of cellulose, which appears to be more rapidly attacked by *P. hirsutus* than by *T. pini*.

CARTER (D. G.), BARR (H. T.), & WOOD (J. B.). **Durability of posts, and results of preservative treatment.**—*Arkansas Agric. Exper. Stat. Bull.* 287, 16 pp., 1 fig., 1 graph, 1933.

The writers discuss and tabulate the results of their field and laboratory experiments on the preservation of oak (*Quercus rubra*) and pine (*Pinus echinata*) for fence posts by various standard treatments directed against the wood-destroying fungi, *Fomes annosus*, *Lentinus lepideus*, and *Lenzites sepiaria* [*R.A.M.*, xi, p. 617 *et passim*].

Pine posts creosoted by the pressure process in a commercial plant were entirely sound after ten years' service [ibid., xii, p. 1], while the home creosote treatment of oak posts (open tank, hot and cold bath) gave an apparent increase of about four years in durability, 50 per cent. being in good condition after ten years. Creosote was the most generally effective of all the preparations tested, but promising results were also given by undiluted used motor oil (short treatments at relatively low temperatures), zinc chloride, molten sulphur, copper aceto-arsenate, copper arsenite, and copper borate.

Cabbage yellows.—*New Jersey Agric. Exper. Stat. Circ.* 283, 2 pp., 1933.

A popular note is given on the symptoms, life-history, and control of cabbage yellows (*Fusarium conglutinans*) [*R.A.M.*, xii, p. 608] in New Jersey, with special reference to the cultivation of resistant varieties.

BREMER (H.). **Die Brennfleckenkrankheit der Erbse.** [Pea anthracnose.]—*Mitt. Deutsch. Landw.-Gesellsch.*, xlviii, 22, pp. 489–490, 1 fig., 1933.

Anthracnose of peas (*Ascochyta pisi*) [*R.A.M.*, xii, p. 483] does not ordinarily occur in a very virulent form in Germany, but recently attention has been directed towards this disease, which may destroy entire stands when the plants are attacked at an early stage. It is uncertain whether the other two fungi associated with pea anthracnose in the United States [*Mycosphaerella pinodes* and *A. pinodella*: ibid., vii, p. 611 *et passim*] also participate in the causation of the disease in Germany. Seed disinfection does not control the serious type of seedling disease which results from internal seed infection and which may be difficult or even impossible to detect outwardly. Care should, therefore, be taken to use seed from healthy crops.

ZAUMEYER (W. J.) & WADE (B. L.). **Mosaic diseases affecting different legumes in relation to Beans and Peas.**—*Phytopath.*, xxiii, 6, pp. 562–564, 1933.

The viruses causing mosaic of white and yellow sweet clover (*Melilotus alba* and *M officinalis*), white clover (*Trifolium repens*), lucerne, peas, and sweet peas are all transmissible to beans (*Phaseolus vulgaris*) [*R.A.M.*, xii, p. 615], while that producing red clover (*T. pratense*) mosaic is not [cf. ibid., ix, p. 121]. On inoculation into beans, the white and *M. alba* viruses induce symptoms of which some resemble the typical mottled and chlorotic condition of common bean mosaic. All the bean-infecting legume mosaic viruses cause systemic infection on beans, except that of lucerne, the lesions of which are purely local, while the white clover mosaic may also produce local as well as systemic injury. Hitherto only the bean mosaic has been found to be transmissible through the seed.

The lucerne mosaic virus infected 24 out of 28 bean varieties tested, that of white sweet clover 21 out of 22, that of white clover 24 out of 26, and that of peas 31 out of 32. The three bean varieties resistant to bean mosaic, namely, Robust, a strain of Great Northern, and a Stringless Green Refugee selection, are also resistant to lucerne mosaic. The *M. alba* and *T. repens* viruses infect the Stringless Green Refugee selection but not the others, while that of pea mosaic attacks both this selection and Robust. Only Great Northern appears to be resistant to all the viruses used.

A mosaic virus (designated as No. III), isolated from a bean hybrid, behaves similarly to the other legume viruses but differs from common bean mosaic. It is systemic but apparently not seed-borne [cf. ibid., xii, p. 614]. Of the 26 varieties inoculated with this virus 24 were susceptible, including Stringless Green Refugee, which is resistant to the common bean mosaic.

The red clover mosaic virus, on inoculation into peas, produced symptoms somewhat resembling those of pea mosaic but gave negative results on sweet peas. Neither peas nor sweet peas contracted infection from the lucerne and bean mosaic viruses, but those of *M. alba* and *T. repens* produced destructive symptoms, quite unlike those of pea mosaic but rather resembling streak, both on peas and sweet peas.

ZALESKI (K.). **Względna odporność na bakterjozę obwódkową odmian Fasol uprawianych w Polsce.** [Relative resistance to halo blight of Bean varieties grown in Poland.]—*Polish Agric. & Forest Annual* (*Roczniki Nauk Rolniczych i Leśnych*), Poznań, xxx, 1, pp. 39–116, 4 pl., 1933. [English summary.]

After a comprehensive review of the work so far done in the investigation of halo blight (*Bacterium medicaginis* var. *phaseolicola*) of beans [*R.A.M.*, xii, p. 271], with particular reference to his own researches in America in collaboration with Burkholder [ibid., xi, p. 418], the author states that the disease, a detailed description of which is given, was discovered for the first time in Poland in 1931, causing considerable damage to field-grown beans (*Phaseolus* spp.) in the region of Poznań. Considerable details are given of 15 months' field and greenhouse tests of 144 distinct (not

counting synonyms) varieties (139 of *P. vulgaris* and 5 of *P. multiflorus*), mostly of Polish origin, for resistance to the disease, all the inoculation work having been done on the lines described in the previous communication [loc. cit.]. The results [presented in the form of tables] showed that of 135 dwarf varieties (some synonymous) tested only three (Szablasta, Zielono-strączkowa Hinricha, and Zuckerperl) were immune, while 18 were highly resistant, and the remainder varied from moderately to highly susceptible. Among the 57 pole varieties (including synonyms) of *P. vulgaris* seven proved to be immune and 29 highly resistant. No correlation was found between the colour (white or purple) of the flowers and resistance or susceptibility. While the investigation showed that *P. multiflorus* must be included in the host range of *Bact. medicaginis* var. *phaseolicola*, all the five varieties tested exhibited a high degree of resistance to the disease both in the field and in the greenhouse.

STAPP (C.). **Verfahren zur Prüfung von Bohnen (Phaseolus vulgaris) auf Resistenz gegen Pseudomonas medicaginis var. phaseolicola Burkh., den Erreger der Fettfleckenkrankheit.** [A method for the testing of Beans [*Phaseolus vulgaris*] for resistance to *Pseudomonas medicaginis* var. *phaseolicola* Burkh., the agent of grease spot disease.]—*Angew. Bot.*, xv, 3, pp. 241–252, 6 figs., 1933.

In order to improve the method of testing their reaction to the causal organism of grease spot disease (*Pseudomonas* [*Bacterium*] *medicaginis* var. *phaseolicola*) [see preceding abstract], bean (*Phaseolus vulgaris*) seedlings of the St. Andreas and Flageolet Rote Pariser varieties were immersed on emergence from the testa, in dilute suspensions of pure cultures of the organism. After 18 hours' immersion in flat dishes in moist chambers, the seedlings were removed, superficially dried by exposure to the air, and planted out in pots in a room with a relative atmospheric humidity of about 60 per cent. and a temperature about 20° C.

This method proved highly efficacious, resulting in a more generalized infection of the seedlings than was obtained by the less reliable methods of spraying the seedlings or inoculating them through needle pricks with a bacterial suspension.

MCCUBBIN (W. A.). **The Lima Bean scab situation.**—*Journ. Econ. Entom.*, xxvi, 3, pp. 625–630, 1933.

During the writer's visit to Cuba in March, 1931, evidence was obtained that the spores copiously produced by the scab (*Elsinoe canavaliae*) fungus on Lima bean [*Phaseolus lunatus*: *R.A.M.*, xi, p. 619] are wind-borne. In one field under observation 80 to 90 per cent. of the pods were infected, yet it was several years since beans had been grown on the site, and at the time of inspection the nearest were two miles distant. Local growers think that stormy weather increases the incidence of scab. The fungus is believed to persist during the period between two crops on living Lima bean plants, wild or escaped, left intact by poor ploughing, or in old fields remaining untouched throughout the summer. Dr. Bruner's experiments showed that numerous applications of a spray or dust

were necessary to ensure control. Various methods of destroying the scab fungus on Cuban Lima bean consignments to the United States are considered, of which the most feasible appears to be shelling at the place of origin.

BAEHNI (C.). **La septoriose (rouille) du Céleri et le Septoria petroselini Desm. var. apii, Br. et Cav.** [Septoriosis (rust) of Celery and *Septoria petroselini* Desm. var. *apii* Br. & Cav.]—*Bull. Soc. Bot. de Genève*, Sér. 2, xxiv (*1931–2*), pp. 1–57, 7 figs., 1933.

A very detailed account is given of the writer's laboratory and field studies at Geneva, Switzerland, on the celery disease caused by *Septoria petroselini* Desm. var. *apii* Br. & Cav. [*S. apii* Rostr.: *R.A.M.*, xii, p. 546], which under local conditions first appears in June and reaches a climax in September. It was found that 15 to 78 per cent. of the seeds in commercial seed samples are infected, secondary spread from the primarily infected seedlings being effected chiefly by rain splashing and contact. As the fungus rarely fructifies on the seedlings, secondary infection of the aerial parts usually only occurs after transplanting, but the author found that spread from root to root readily takes place and can lead to extensive infection in the seed-beds. Under experimental conditions in agar cultures of the seedlings root infection developed at the beginning of the fourth week after the inoculation of the seedlings with a suspension of the conidia. The roots turned brown and became enveloped by a mycelial sheath which progressed downwards towards the tip but did not generally involve the region of active root hair development. Near soil level this sheath (composed of very dark green hyphae, black in the mass) forms a dense coating. After some time the leaves begin to turn yellow and at this critical juncture two possibilities arise: either the plant reacts by the production of new roots and ultimately recovers, or under exceptional circumstances (4 out of 25 of the cases under observation) the feeding roots become disorganized and desiccation ensues in four or five days.

The aerial mycelium of *S. apii* was found to develop better on acid than on alkaline media. On Coons's agar growth was promoted by the presence of asparagin and levulose. Conidial growth reached a maximum in a slightly acid medium containing ammonium chloride, while pycnidia developed most profusely in the presence of potassium nitrate. The dissemination of the conidia of *S. apii* is most readily effected when the temperature remains at a constant high level for an appreciable period. At the same time, this condition favours the development of the host, whereas cool nights and misty days are adverse to the latter while stimulating the fungus. The maximum damage, therefore, may be expected during the early autumn.

The most susceptible varieties are the grand doré amelioré, blanc amélioré, and plein blanc doré, while plein blanc Lepage and vert maraîcher are comparatively resistant, especially the last-named. Promising results were obtained by seed treatment with sodium hypochlorite [cf. ibid., xi, p. 370].

NEILL (J. C.). **Celery spot and its control.**—*New Zealand Journ. of Agric.*, xlvi, 5, pp. 289–292, 3 figs., 1933.

After referring to the wide prevalence of celery blight (*Septoria apii*) [see preceding abstract] in New Zealand the author states that in a field trial with four varieties at Palmerston North a first-class, disease-free stand was obtained from infected seed by dipping for ten minutes in water at 136° F., followed by plunging into cold water for two minutes and rapid drying, the seed then being stored in the ordinary way. Untreated seed from the same packets gave a heavily diseased crop. As this treatment reduces the germinability of one-year-old seed by about 10 per cent., and that of two-year-old seed by about 50 per cent., while it would probably kill older seed, only fresh seed must be used, and a preliminary, small-scale test should be made of the effect on germination. Brief notes are given on further sanitary precautions recommended.

ORCHARD (O. B.). **The control of Cucumber mildew.**—*Eighteenth Ann. Rept. Cheshunt Exper. & Res. Stat., Hertfordshire, 1932*, p. 48, 1933.

Although reasonably good control of cucumber mildew (*Erysiphe cichoracearum*) was given by shirlan paste with agral I as spreader [*R.A.M.*, xi, p. 679] the mixture had a hardening and slightly scorching effect on the plants. When agral N was substituted for agral I it had twice the wetting properties of the latter and the plants were not scorched.

To secure satisfactory control the cucumbers must be sprayed every three or four days during the first month of the attack and at weekly intervals afterwards. After each spray application the oldest leaves must be thinned out. It is essential that the leaves should be sprayed until they drip, otherwise there is not enough fluid present to penetrate and destroy the spore masses.

LEACH (J. G.). **A destructive Fusarium wilt of Muskmelons.**—*Phytopath.*, xxiii, 6, pp. 554–556, 1 fig., 1933.

Golden Osage muskmelons in Minnesota were severely injured in 1932 by a species of *Fusarium* closely resembling *F. niveum*, the agent of watermelon wilt [*R.A.M.*, xii, p. 418], but differing from the latter in its paler red or purple pigmentation on nutrient media, its abundant production of microconidia, and fewer, shorter macroconidia (24 to 45 μ, as against 27 to 60 μ for the watermelon wilt organism). The two fungi showed marked differences in pathogenicity, muskmelons being completely resistant to the culture of *F. niveum* from watermelon and highly susceptible to that from muskmelon, whereas Kleckley Sweet watermelons behaved in an exactly opposite manner. The muskmelon fungus may be a physiologic form of *F. niveum* or may be a closely allied species. It is believed to have been present in the State for at least three years. At an advanced stage the diseased plants develop brown, necrotic streaks extending from the base for 2 ft. or more along one side of the stem and bearing masses of salmon-pink spores.

HOPFE (E.). **Sind vom Spargelrost befallene Spargelkulturen noch zu retten?** [Can Asparagus plantings attacked by Asparagus rust be saved?]—*Ratschläge für Haus, Garten, Feld*, viii, 6, pp. 84–85, 1933.

Directions are given for the control of asparagus rust [*Puccinia asparagi*: *R.A.M.*, xii, p. 336] in the Mark Brandenburg, Germany, by weekly applications of nosprasit 'O' [ibid., xii, p. 223], combined with thorough sanitation and the liberal use of a complete fertilizer. It is claimed that nosprasit 'O' is thoroughly effective against the rust.

VIDAL (J. L.). **Pour lutter contre la chlorose de la Vigne.**—*Journ. d'Agric. Prat.*, N.S., xcvii, 25, pp. 505–506, 1933.

Directions are given for the treatment of vine chlorosis by the usual methods and it is recommended that in highly calcareous soils, where chlorosis is apt to be very prevalent, the choice of lime-tolerant stocks should be carefully made. Among these are mentioned (in ascending order of tolerance) Riparia, 101–14, 3·306, 3·309, Rupestris du Lot, 34 E.M., 161–49, Aramon x Rupestris Ganzin No. 1, R. 31, C. 1,202 and 93–5, 41 B., 333 E.M., and Berlandieri x Colombard.

PETRI (L.). **Rassegna dei casi fitopatologici osservati nel 1932.** [Review of phytopathological records observed in 1932.]—*Boll. R. Staz. Pat. Veg.*, N.S., xiii, 1, pp. 1–73, 1 fig., 1933.

Several cases of wilting of grape vines have been recently observed in various places in Italy and Sardinia. In one of these a *Fusarium* tracheomycosis is considered to be responsible in soil that had been repeatedly used for many years for striking layers. In others the condition resembled the progressive loss of growth activity recently described by the writer [*R.A.M.*, xii, p. 418]. The roots remained healthy and no leaf roll was present. A necrosis of the wood and cambium spreading from the top of the stem downwards to the graft union was associated with the presence of a secondary mycelium in the xylem causing tyloses to develop in the vessels and the formation of a brown gum. In these cases the vines were grafted on American stocks, such as Rupestris du Lot and Aramon x Rupestris. In one vineyard evidence was obtained that the disease is able to spread slowly through the soil.

Olives in Liguria, Campania, and Sicily shrivelled up while still on the trees. The cortical parenchyma of the stalks, which were withered and exuded a gummy substance, showed the presence of *Macrosporium oleae* [ibid., iii, p. 324], which is considered to be a weak parasite. In culture a perithecial stage determined as *Pleospora herbarum* was obtained.

Banana inflorescences from Eritrea showed a brown discoloration and mould of the bracts; the necrosed tissues contained *Nigrospora sphaerica* and *Stachylidium theobromae* [ibid., xi, p. 765], but the parasitism of these organisms was doubtful, both being regarded as usually saprophytic. Bananas from the same locality, rotted at the apex as a result of weather conditions, showed the presence of *S. theobromae* in the affected tissues.

The bacterial disease of figs due to *Bacterium fici* Cav. [ibid., iii, p. 524] occurred in the vicinity of Rome.

The leaves of mandarins (*Citrus* [*nobilis* var.] *deliciosa*) growing in Liguria showed typical 'greasy spot', apparently due to physiological disturbances set up through excessive pruning or unfavourable weather [cf. ibid., xi, p. 698].

Citrus fruits in Sicily were attacked by *Sclerotinia sclerotiorum*, *S. fuckeliana*, *Glomerella cingulata*, *Pleospora herbarum*, *Limacinia penzigi* [*L. citri*: ibid., iii, p. 211], and *Septoria citri* var. *minor*; *Phomopsis cytosporella* caused stem-end rot of lemons. The section on citrus diseases concludes with a detailed discussion of various disorders due to insect attack, non-parasitic spotting, sclerosis of orange rind, creasing or puffing of oranges [ibid., xi, p. 104], oleocellosis [ibid., x, p. 24], irregular brown spot of oranges, internal decline of lemons [ibid., xii, p. 214], hollow core, cold storage spots, gum spots on mandarin oranges, and mechanical injury caused to lemons by scraping against the branches.

A serious root rot of chestnut seedlings growing near Rome was caused by a *Pythium*. From small cankers at the forking of young withered branches of *Quercus ilex*, *Diplodia amphisphaeroides* was isolated and is considered to be responsible for the condition though hitherto known only as a saprophyte on the dead bark of oaks. On the young branches of *Coffea arabica* from Eritrea affected by a withering of the tips, the author found perithecia differing from those of *Anthostomella coffeae* to which Delacroix attributed an apparently identical condition, as well as an *Ascochyta*, probably forming part of the life-cycle of the perithecial fungus.

Maize growing in an experimental plot near Rome developed a striped chlorosis resembling streak [ibid., xii, p. 143] and regarded as probably a deficiency disease. *Cicer arietinum* in the vicinity of Cosenza was appreciably damaged by collar and root rot due to *Rhizoctonia violacea* [*Helicobasidium purpureum*]. Much injury was caused to cotton (especially 10- to 12-day-old seedlings) in Eritrea as a result of attack by *Bact. malvacearum* [ibid., x, p. 775].

BRAUN (K.). **Tätigkeitsbericht der Biologischen Reichsanstalt für Land- und Forstwirtschaft, Zweigstelle Stade, für die Zeit von 1. April 1932 bis 31. März 1933.** [Report on the work of the National Biological Institute for Agriculture and Forestry, Stade Branch, for the period from 1st April, 1932 to 31st March, 1933.]—Reprinted from *Alländer Zeit.*, Jork, 94, 98, 102, 106, 110, 114, 7 pp., 1933.

The following are amongst the items of phytopathological interest occurring in this report. Notwithstanding the varying times of maturation and ejection of the *Fusicladium* [*Venturia inaequalis* and *V. pirina*] ascospores in the spring of 1932, nearly all apple and pear varieties in the North German districts under observation contracted a sudden attack of scab during the early part of June, attributable to infection in the wet weather at the end of May. The current year's apple seedlings in a breeding plot were infested by mildew [*Podosphaera leucotricha*: *R.A.M.*, xii, p. 517] to an

extent unparalleled in the Stade district; a few pears were attacked by the same fungus [ibid., x, p. 247].

No increase in the resistance of celery to *Septoria apii* [see above, p. 744] or in yield was obtained by applications of potash-magnesia.

NATTRASS (R. M.). **Annual Report of the Mycologist for the year 1932.**—*Ann. Rept. Dept. of Agric. Cyprus for the year 1932*, pp. 44–49, 1 fig., 1933.

This report contains the following items of phytopathological interest other than those already noticed from other sources [*R.A.M.*, xii, pp. 323, 506]. *Vicia* sp. was attacked by a *Cercospora* leaf spot, probably *C. fabae* [ibid., xii, p. 263] not previously reported in Cyprus. It was occasionally severe on plants growing in the shade. The spores measured 70 to 125 by 4 to 6·3 μ and had up to 12 septa; the dark conidiophores measured 29·4 to 46·2 by 4·2 to 8·4 μ. Cowpeas (*Vigna*) [*sinensis*] were severely attacked by *Uromyces vignae* [ibid., x, p. 810] while French beans [*Phaseolus vulgaris*] in close proximity to, and in some cases touching the affected cowpeas remained healthy. Celery was attacked by *C. apii* [ibid., xi, p. 761] and *Septoria apii* [ibid., xii, p. 546 and last abstract], the latter recorded for the first time in Cyprus. In many of the older citrus groves symptoms apparently identical with those of 'mal secco' were general, but *Deuterophoma tracheiphila* [ibid., xii, p. 214] has not yet been isolated from the affected trees. Citrus fruit rots were caused by an *Alternaria* and by *Pleospora herbarum* [ibid., xi, p. 449].

Mummied pomegranates on the tree showed the presence of a *Ceuthospora* thought by the Imperial Mycological Institute to be probably *C. phyllosticta*, which caused a blackening of the fruits with the formation of black, carbonaceous, multilocular pycnidia under the rind epidermis, on the inner surface of the rind, and on the walls and locules in the fruit. The rod-shaped, slightly curved pycnospores had rounded ends and measured 4 to 5 by 1·5 to 1·8 μ; they were borne on branched conidiophores, usually curved, tapering towards the apex and up to 16 μ long. The fungus was not seen on living leaves but was isolated from dead twigs and from cankers on living twigs. Cultures from the twigs inoculated into ripe fruits produced a rot identical with that produced by a culture from the fruit: the fungus appears to be an active parasite causing fruit rot, twig die-back, and canker. Another rot was observed on mummied pomegranates, the outer surface of the rind of which was covered with partly immersed fruit bodies up to 1 mm. in diameter. The fungus was identified at the Imperial Mycological Institute as *Coniella granati* (Sacc.) Pet. and Syd. Inoculations with pure cultures on ripe fruits produced a fairly rapid rot. The fungus was seen only in the Paphos district and was not found on twigs or leaves.

A leaf spot of chicory was caused by an unnamed *Alternaria*, identical with one causing a similar disease on the same host in Florida [ibid., ix, p. 224].

An *Oidiopsis* was particularly abundant in late summer and

autumn on eggplant, *Hibiscus esculentus*, *Capsicum annuum*, and tomatoes [ibid., xi, p. 696].

STOREY (H. H.). **Report of the Plant Pathologist.**—*Fifth Ann. Rept. East African Agric. Res. Stat., Amani, 1932–3*, pp. 13–17, 1933.

In addition to items already noticed from other sources, this report contains the following information. Work with *Cicadulina zeae* has shown clearly that the capacity of this insect to transmit the maize streak virus is controlled by an hereditary factor [*R.A.M.*, xii, p. 686].

An attempt to breed strains of tobacco immune from leaf curl [ibid., xii, p. 143] has been initiated with seed of the standard varieties supplied by the Nyasaland and Southern Rhodesian Departments of Agriculture.

The vector of cassava mosaic [ibid., xii, pp. 202, 352], which is known to be a virus disease, still remains to be identified. The 'green flower' [leaf curl] disease of sim-sim [*Sesamum indicum*], important in Uganda and Tanganyika [cf. ibid., xii, p. 552], is also suspected to be due to a virus. Further investigations are necessary in connexion with a streak-like disease of a certain sugar-cane variety, apparently different from the well-known streak of Uba [ibid., xii, p. 658].

HOPKINS (J. C. F.). **A list of plant diseases occurring in Southern Rhodesia. Supplement 3.**—*Rhodesia Agric. Journ.*, xxx, 6, pp. 504–506, 1933.

This further supplement gives a list of the fungal, bacterial, and virus diseases (arranged by their hosts) which were observed on 28 plants in Southern Rhodesia during the period from June, 1932, to May, 1933 [cf. *R.A.M.*, xi, p. 746]. In an amendment to the previous lists the author states that he now accepts the new combination *Alternaria longipes* suggested by Tisdale and Wadkins for the fungus previously identified as *A. tabacina* [ibid., x, p. 763].

Forty-third Annual Report of the New Mexico Agricultural Experiment Station for the fiscal year ended June 30, 1932. —85 pp., 9 figs., 1932. [Received September, 1933.]

The following are amongst the items of phytopathological interest in various sections of this report. A reduction in the incidence of chilli pepper [*Capsicum annuum*] wilt [*Fusarium annuum*: *R.A.M.*, ix, p. 630] was effected by keeping the moisture content of the soil to a low level, and by ridging as the plants grew.

The predominant insect vector of virus diseases in tomato fields was *Eutettix tenella*, the adults appearing about 15th June and reaching their maximum abundance at the end of the month. Transmission tests from beets affected with curly top led to the development of tomato yellows in 10 days to three weeks after the infective insects were caged on the plants. The new curly top resistant beet, U.S. No. 1, yielded in infected fields at Las Vegas 13·4 tons per acre, compared with 6·7 for commercial varieties.

The fungus isolated from apple trees affected by measles [ibid., xii, p. 378] has not been positively identified but is stated to belong to the Sphaeropsidales. Infection is confined to the cambium and does not penetrate into the woody portions. A survey of different orchards showed the Jonathan to be the most susceptible variety, while Gano, Ben Davis, Winesap, Arkansas Black, and Delicious are practically immune. The fungus is found mainly on neglected or otherwise diseased trees in badly irrigated or chemically unbalanced soils.

Melchers (L. E.). **Plant disease problems in Egypt.**—*Trans. Kansas Acad. Sci.*, xxxv, pp. 38–62, 1932.

The writer's observations on Egyptian phytopathological problems investigated during 1927–9 are prefaced by some general remarks on the topographic and climatic conditions of the country. The following are some of the more interesting records.

Wheat is frequently attacked by a disease first described from India by C. M. Hutchinson (*Mem. Dept. Agric. India*, Bact. Ser., i, 7, 1917), due to the combined activities of a bacterium (*Pseudomonas tritici*) and the eelworm *Tylenchus tritici*, and thought to have been introduced into Egypt on seed. The head may be partially or wholly invaded down to the lower portion of the peduncle. The growth on the ears formed by *P. tritici* is shiny and yellow at first, later becoming hard, darker, and flaky. The actual damage to the wheat seems to result mainly from the eelworm.

In connexion with his studies on wheat mosaic and rosette [*R.A.M.*, x, p. 300], the writer found that a high degree of resistance was shown by the Sinai and Persian varieties.

Rust (*Uromyces fabae*) of broad beans (*Vicia faba*) [ibid., xii, p. 596] causes heavy damage every season to this very important crop.

Mosaic occurs on *V. faba* [ibid., x, p. 700 *et passim*] and on *Phaseolus vulgaris*, on which it is common and rather destructive [ibid., xii, p. 614]. Other crops affected with mosaic are tomato (mottled and 'fern-leaf' forms) [ibid., xi, p. 754], pepper [*Capsicum annuum*], sweet melon, and sugar-cane. Streak [ibid., xii, p. 658] was prevalent and widespread on the last-named crop, having probably been confused with mosaic in previous reports.

Bunchy top or rosette occurs to a limited extent and in a relatively mild form in banana plantations.

Gummosis of citrus, peaches, apricots, and plums [ibid., xii, pp. 368, 575] is stated to be very destructive and apparently on the increase. Citrus also suffers considerably from die-back in neglected orchards.

Mango trees are liable to dwarfing, sometimes accompanied by necrosis of the woody tissues, possibly in association with leaf spot (? *Bacillus mangiferae*) [ibid., xi, p. 793].

Truscott (J. H. L.). **Observations on Lagena radicicola.**—*Mycologia*, xxv, 4, pp. 263–265, 11 figs., 1933.

In the autumn of 1931 the writer isolated *Lagena radicicola* from soil in Vineland, Ontario, on the hosts originally noted by

T. C. Vanterpool and G. A. Ledingham in Saskatchewan, namely, wheat, barley, rye, and maize [*R.A.M.*, ix, p. 581], and in the summer of 1932 it was again found in the same district on *Agropyron repens* and a number of other wild grasses. The Ontario form of the fungus differs from that occurring in Saskatchewan in its typically branched and larger sporangia, as well as in an unusual compound type of spore. Evidence was obtained that more than one resting spore may be produced in a single female thallus. Multiple fertilization was observed in living material of the Saskatchewan form; in that from Ontario the gametangia are so closely entwined that the detection of this process would be very difficult. Hitherto it has been impossible to obtain pure cultures of these fungi, and the question of specific differentiation between the two forms must therefore be left open for the present.

PRETORIUS (W. J.). **Losses caused by rust in Wheat.**—*Farming in South Africa*, viii, 82, pp. 12–13, 1933.

During the seasons 1930–1 and 1931–2 data were collected by the Division of Economics and Markets on the losses caused by wheat rusts [*Puccinia* spp.] in the western Cape Province. According to the estimates of 50 farmers in the Swartland (Malmesbury area), the losses through rust in 1930–1 and 1931–2 were 21·16 and 13·85 per cent., respectively. In the Caledon-Bredasdorp area rust destroyed 16·24 per cent. in 1930–1 but was negligible in the following year. No data are available for the Union of South Africa as a whole, but supposing the above-mentioned losses to represent 10 per cent. of the total, an annual reduction of 300,000 to 400,000 bags, equivalent to the same number of pounds sterling, would be entailed.

NEATBY (K. W.). **The type of infection of Wheat seedlings by Puccinia graminis tritici in the greenhouse as a measure of the percentage infection in the field.**—*Scient. Agric.*, xiii, 10, pp. 625–635, 1933. [French summary on p. 668.]

After a brief reference to his preliminary report of his study of the relation between the reaction in greenhouse seedlings and in the field of the Garnet × Double Cross and Marquillo × H–44–24 wheat hybrids to infection with *Puccinia graminis tritici*, the results of which in regard to the first-named were considered to be inconclusive [*R.A.M.*, xi, p. 438], the author gives details of further experiments carried out on the same lines with the Garnet × Double Cross, Garnet × Marquillo, and Marquillo × Reward crosses and physiologic form 21 of *P. g. tritici*. The results [the statistical significance of which is shown in tables] indicated that in these crosses the inheritance of the field reaction to black rust (as determined by percentage infection) is mainly, if not entirely, controlled by the same factors which govern the inheritance of the seedling reaction in the greenhouse (as determined by the type of the pustules) to form 21. This is considered to show that Marquillo and Double Cross do not possess the 'mature plant' resistance which had been previously shown to exist in H–44–24 and Pentad [ibid., xi, p. 228].

BIRAGHI (A.). **Sul presunto parassitismo dell' 'Urocystis occulta' (Wallr.) Rabenh. sul Frumento in Italia** [On the presumed parasitism of *Urocystis occulta* (Wallr.) Rabenh. on Wheat in Italy.]—*Boll. R. Staz. Pat. Veg.*, N.S., xiii, 1, pp. 174–179, 1933. [English summary.]

After stating that infections of wheat by *Urocystis* are uncommon in Italy, where they have invariably been attributed to *U. occulta* [*R.A.M.*, xii, p. 681] the author briefly summarizes the chief differences between this fungus and *U. tritici*. He points out that neither can infect the host of the other, and that the spores of *U. occulta* germinate readily, have a smooth surface, are arranged in a simple, interrupted layer, and measure 4 to 8 μ in diameter, while those of *U. tritici* germinate only with difficulty, have a granulated surface, are often confluent and serried, and measure 5 to 12 μ in diameter. A typical instance of *Urocystis* infection of wheat is briefly described and it is stated that the spores ranged from 7 to 14 μ in diameter. In view of these facts the author concludes that the fungus examined by him was certainly *U. tritici* and that all the infections of wheat hitherto attributed to *U. occulta* in Italy have in fact been due to *U. tritici*.

HANNA (W. F.) & POPP (E.). **The overwintering of bunt spores in Western Canada.**—*Scient. Agric.*, xiii, 10, pp. 636–637, 1933. [French summary on p. 668.]

This is a brief report of the results of experiments during the winter of 1931–2 in six different localities of Western Canada, which showed that when ears of Mindum wheat infected with bunt (*Tilletia tritici*) [*T. caries*] where left over winter on the surface of the soil, the viability of the bunt spores was found in the spring to range from low in Winnipeg to medium or high in the other places. When, on the other hand, the ears were buried at a depth of 6 inches, the germination in the spring of the spores was very considerably reduced or nil, except at Winnipeg, where it was somewhat higher than that of the spores in the ears left above ground. The results are considered to indicate that the possibility of the soil being infected from bunted ears of the preceding wheat crop left in the field over winter may usually be greatly reduced by autumn ploughing.

EIDELMAN (Mme Z. M.). Основные результаты опытов искусственного уменьшения листовой поверхности в разных географических пунктах. [Fundamental results of experiments involving the artificial reduction of leaf surface in different geographical areas.]—*Bull. Plant Protection*, 3rd Ser.: *Control Measures and Implements*, Leningrad, part 3, pp. 65–72, 1933. [English summary.]

In this paper the author briefly summarizes the results of experiments [which are fully described and discussed in three separate communications] carried out on the same pure line of spring wheat by herself in Leningrad and by E. Telitchko and E. Siriatchenko in Kieff [Ukraine], and on a line of winter wheat and on oats at Belaya Tzerkoff, Ukraine, by V. Shevtchenko, to determine the

effect on the further development of the plants and on their yield of the mechanical recision of varying percentages (from 25 to 100) of the total leaf surface at different stages in the development of the plants, the general aim of the work being to establish the effect of the injury caused by various parasites (e.g. *Puccinia* spp.) to the foliage under different ecological conditions.

The chief conclusions drawn from the Belaya Tzerkoff tests are that the experimental reduction of the leaf area in both winter wheat and oats during the earlier stages (tillering and culm formation) of the plants retards their further development by a maximum of about two weeks and is reflected in the subsequent vigour of the plants, this effect being more pronounced in the reproductive than in the vegetative organs. Recision of the leaves during the tillering and culming phases reduced the yield in grain much more in oats than in winter wheat, and a statistical analysis of the results clearly demonstrated the direct relationship of the percentage reduction in yield to the percentage amount of the leaf surface removed. At later stages the effect of the operation was more uniform on both hosts, but the removal of 100 per cent. of the foliage at the earing stage again affected the oats markedly more than the wheat, the operation resulting in the former in a reduction in yield by 71·8 per cent. of the controls, as against a reduction by 54·9 per cent. in wheat. The quality of the grain (as judged by the relative weight of 1,000 grains) was also more adversely affected by the removal of all the various percentages of leaf at all stages of growth in oats than in wheat. Finally, the experiments demonstrated that the presence on the plants of the lower leaves is of considerable importance to the yield even at the blossoming and milky maturity stages, since the removal of the oldest and lowest leaves at either stage resulted in a reduction of the weight of 1,000 grains by 17 to 20 per cent.

The results of the experiments in Leningrad and Kieff showed that in the latter locality spring wheat displays a much weaker reaction to external stimulation even at stages as early as the two-leaf stage, as indicated by the fact that the coefficient of injuriousness (i.e., ratio of percentage reduction in the dry weight of the plant to 1 per cent. recision of the total leaf surface) of the removal of 50 per cent. of leaf surface was only 0·5 as against 1·26 in Leningrad. It is believed that in Kieff the spring wheat has a greater capacity of compensating for the deficient assimilating surface by intensifying the activity of the leaf portion remaining after the operation, and also that of the leaf sheaths. The effect of the leaf removal was weaker at later stages, as indicated by the injury coefficients of 0·28 and 0·24 (at the culming and flowering stages, respectively) for the removal of 100 per cent. of the leaves in Kieff, as against 0·69 and 0·48 for Leningrad. While the experiments in both localities again showed that the recision of the leaves had a greater depressing effect on the quantity and quality of the grain than on the formation of the vegetative parts, the grain reduction was much less in Kieff than in Leningrad, since in the former a considerable reduction (47 per cent.) in the weight of 1,000 grains was only obtained by the removal of 100 per cent. of the foliage at the two-leaf stage, while marked reductions

were obtained in Leningrad by recisions amounting to 25 and 50 per cent. of the leaf surface (13 and 30 per cent., respectively).

EIDELMAN (Mme Z. M.) & BANKUL (E. A.). Влияние механического уменьшения листовой площади и разных условий питания на накопление сухого вещества у злаков. [Effect of the mechanical reduction of leaf area and of different nutritional conditions upon the accumulation of dry substance in cereals.] —*Bull. Plant Protection*, 3rd Ser.: *Control Measures and Implements*, Leningrad, part 3, pp. 113–130, 2 graphs, 1933. [English summary.]

An account is given of open-air experiments on barley plants grown in pots with sterilized and carefully washed sand, to which various doses of nutrient elements were added, to determine the effect on the subsequent development of the plants of leaf injury of varying degrees of severity, as represented by the mechanical removal of a given percentage of the total leaf area [see preceding abstract]. It was found that at the culming stage the removal of 25, 50, or 100 per cent. of the leaves did not appreciably influence the onset of the development of the inflorescence, flowering, and earing, which depended to a much greater extent on the composition of the nutrient medium. The relative weights of the different vegetative organs also remained fairly constant with different doses of a complete fertilizer, no matter how extensive the lesion was, though of course the absolute weight varied with the severity of the lesion. This leads to the conclusion that soil fertilizers act on leaf-diseased plants in the same way as on healthy ones. Barley reacted to the severity of leaf lesions under the different nutritional conditions to a much less extent than spring wheat, and its yield was also less adversely affected; its root system suffered from the treatment even less than the overground parts. Phosphorus, as well as most of the other nutrients, appeared to have a stimulating effect on the photosynthetic energy, while with nitrogen the tendency was the reverse. Under all the nutritional conditions tested a reduction of up to one-half of the assimilating surface of the plants had a stimulating effect on the photosynthetic activity of the remaining portions of the leaves.

The work is considered to indicate that an analysis of the effect of the single factors concerned in the expression of pathological symptoms in plants (in the present case, the nature and varying doses of nutrients) may lead to an approximate understanding of the operation and influence of these factors on the yield of the plants in nature.

POWERS (L.) & HINES (L.). **Inheritance of reaction to stem rust and barbing of awns in Barley crosses.**—*Journ. Agric. Res.*, xlvi, 12, pp. 1121–1129, 2 figs., 1933.

A brief account is given of the authors' experimental and statistical study (in naturally induced epidemics) of the inheritance of resistance to physiological forms 17, 38, and 49 of *Puccinia graminis tritici* [cf. *R.A.M.*, xii, p. 556], in crosses between a rust-resistant and rough-awned (Peatland) and two susceptible and

smooth-awned (Glabron and Minnesota 462) varieties of barley. The results showed that in these crosses resistance was dominant, and that in Peatland and Glabron the reaction to the rust was differentiated by a single factor pair (*Tt*). No evidence was obtained of a linkage between the factor pair governing the reaction to rust and that determining the roughness or smoothness of the awns in the progeny.

The results are considered to indicate that it should be relatively easy to produce a smooth-awned, high-yielding variety of barley resistant to physiological forms 17, 38, and 49 of *P. g. tritici*.

Bennett (F. T.). **Fusarium species on British cereals. Fusarium nivale (Fr.) Ces. (= ? Calonectria graminicola (Berk. & Br.) Wr.).**—*Ann. of Appl. Biol.*, xx, 2, pp. 272–290, 4 pl., 1 fig., 2 graphs, 1933.

In a further contribution [*R.A.M.*, xi, p. 504] the author gives details of his study of a strain of *Fusarium nivale* isolated (with *F. culmorum*, *F. avenaceum*, and *F. graminearum* [*Gibberella saubinetii*]) from the base of diseased plants of perennial rye-grass (*Lolium perenne*) and oats on a Cumberland farm, and also from barley grains and the grasses of golf greens in Northumberland and Durham. All his isolations resembled each other in pure culture in morphological and physiological features, but differed constantly and significantly in the size of conidia and in form and rate of growth on certain selective media from a continental strain of *F. nivale* (*Calonectria graminicola*) obtained from Baarn.

Under controlled conditions the fungus was shown to cause in wheat, barley, oats, and rye some loss of plants before or after germination, and also to retard the growth of established plants developing under adverse environmental conditions, independently of whether the infection resulted from contaminated soil or seed. Favourable growing conditions appeared in a large measure to counteract the effects of early attack. It was further shown to attack the ears and grain of these cereals, either preventing the grain from forming or causing discoloration of the formed grains to an extent capable of seriously affecting the yield and the market value of the crops; such attacks, however, appear to occur but rarely in the field, where the chief damage done by *F. nivale* is restricted to a general reduction in vigour of the plants. The effect of infection on perennial and Italian (*L. italicum*) rye-grass is first a reduced rate of growth, and in pot experiments the former was largely killed off by the end of the current season; there was evidence that in the field the death of the plants would occur in the second season of growth. Another distinguishing feature between the continental and the British strains is that, in comparative experiments, the former appeared to be more virulent to the cereals and less virulent to the grasses than the latter.

In pure culture *F. nivale* was found to grow vigorously within the range of normal summer shade temperatures, with an optimum at 20° to 21° C.; it grows slowly at 0° to 1°, and in its vegetative form is able to withstand exposure to temperatures as low as –20°, but is killed in a few days at a temperature of –32° C. While its life and pathogenicity are not appreciably affected by the acid or

alkaline reaction of soils within the ordinary field range, and it was shown to be capable of growing on media with P_H values ranging from 2·5 to 13, with an optimum from 6·5 to 6·9, its conidia did not germinate in media with an acidity of more than P_H 5·2 to 5·0.

WINKELMANN (A.). **Eine Methode zur Prüfung von Mitteln gegen Fusarium im Laboratorium.** [A method of testing anti-*Fusarium* preparations in the laboratory.]—*Nachrichtenbl. Deutsch. Pflanzenschutzdienst*, xiii, 7, pp. 49–50, 1933.

A number of [unnamed] preparations were tested in the laboratory for their efficacy against *Fusarium* infection of cereal seed-grain. Naturally infected seeds, treated in the prescribed manner with the different fungicides, were placed in Petri dishes on a medium of 30 gm. oatmeal, 20 gm. agar, and 5 c.c. glycerine per 1 l. of water, with the addition of 0·5 c.c. lactic acid and 50 mg. methyl or gentian violet [*R.A.M.*, xii, pp. 371], the two last-named exerting an inhibitory action on the growth of surface contaminants. The largest number of healthy seedlings was yielded by the lot treated with a liquid solution designated I, and applied by sprinkling at a strength of 0·35 per cent., the seed-grain being subsequently left covered for six hours. Dusts I and II (2 and 3 gm. per kg. of seed-grain) respectively, also gave good results—even better than those with the liquid in supplementary greenhouse-tests, in which the percentages of diseased plants for the three selected preparations were 4·2, 1·1, and 1·8, respectively. The untreated controls were completely infected in the laboratory tests and showed 46·1 per cent. *Fusarium* infection in those in the greenhouse.

PAXTON (G. E.). **Consistent mutation of Helminthosporium sativum on a no-nitrogen medium.**—*Phytopath.*, xxiii, 7, pp. 617–619, 1 fig., 1933.

On Czapek's agar *Helminthosporium sativum*, isolated from barley in California, produced only occasional sectors, whereas all colonies on the same medium without nitrogen gave rise to saltants, of which one type occurred on every culture and differed distinctly from the original colony [cf. *R.A.M.*, ii, p. 59; viii, p. 496; xi, p. 393]. The mycelium of this mutant was darker, growth was faster, and sporulation was heavier than in the normal type, while the spores of the former were darker brown, shorter, and more rounded at the ends, measuring 55 by 22 μ (average of 500) compared with 72 by 22 μ. No tendency to reversion has been shown by subplants of the saltant during five generations in culture on Czapek's agar. No sectors developed when sucrose as well as nitrogen was omitted from the medium.

SAMPSON (KATHLEEN). **The biology of Oat smuts. III. The development of two biological species of Ustilago kolleri (Wille) on a selection of Avena strigosa orcadensis (Marquand).**—*Ann. of Appl. Biol.*, xx, 2, pp. 258–271, 1 pl., 5 figs., 1933.

In continuation of her studies of the biology of oat smuts

[*R.A.M.*, viii, p. 498] the author describes her histological investigation of the development in *Avena strigosa orcadensis* of two strains of *Ustilago kolleri*, the first of which was shown in preliminary experiments [loc. cit.] to be highly virulent on this host (100 per cent. infection), which was highly resistant to the second, although the latter caused 100 per cent. infection on the potato oats (*A. sativa*). It was found that, under certain experimental conditions, both strains enter the host plant with equal facility, but that while the progressive development of the first strain in the host tissue, culminating in the production of spores in the panicle, agrees closely with the description of the process by other workers (e.g., Kolk) [ibid., x, p. 722], the growth of the second strain, following successful infection of a resistant host such as *A. s. orcadensis*, is retarded and the fungus fails to reach the growing apex before the tissues of the primary node become lignified, with the result that the panicles are not infected. In the case of the virulent strain, however, the author did not find the mycelium of the fungus in the space between the first leaf and the coleoptile, as described by Dr. Kolk, and believes that the parasite usually passes from the coleoptile to younger organs *via* the primary node. Individual strands of mycelium of either strain appeared to be equally healthy within the tissues invaded by them, with no particular microscopical features to distinguish the one from the other. No indications were found of encasing sheaths such as described by various observers.

In a brief discussion of the bearing of these results on the question of the inheritance in oats of resistance to smut, the author draws a parallel between the failure by the non-virulent strain (to *A. s. orcadensis*) to infect throughout its host, and the phenomenon of sterility in higher plants, best explained by incompatibility between pollen and stigma. It is suggested that the host plant may offer an 'uncongenial' medium to the parasite, depending on somewhat similar genes to those responsible for pollen and stigma incompatibility.

Briton-Jones (H. R.). **Stripe disease of Corn (Zea mays, L.) in Trinidad.**—*Trop. Agriculture*, x, 5, pp. 119-122, 4 pl. [2 facing p. 144], 1933.

Since 1929, maize in Trinidad has been severely affected by a leaf stripe closely resembling that described by Stahl in Cuba [*R.A.M.*, vii, p. 159] and associated with infestation by the leafhopper *Peregrinus maidis*, the vector of Stahl's disease and also of the similar one found in Tanganyika [ibid., xii, p. 143]. Soon after the silks appear, stripes of light-coloured tissue varying in width from thin hair lines to broad bands affecting practically the whole surface of the leaf except the midrib develop along the lamina between the main veins. The affected leaves generally wither from the tip backwards and from the margin inwards. Early attacks also occur and lead to stunting of the plants and bunching of the upper internodes, which are frequently bent over to one side. When the attack is severe the cobs are often worthless, and occasionally they are deformed from outgrowths of the rudimentary leaves composing the husk. The only difference between this disease and

the Cuban one is that the leaf stripes are sometimes reddened in the former.

In a letter to the author, C. N. Priode states that three distinct types of striping, all equally injurious, are present in Cuba, even on plants of the same variety growing in one place. The first type consists in very fine, close stripes due to a whitening of the veins sometimes fading into short strips or dots of various lengths. In severe attacks the affected tissues become necrotic. The second type consists in distinct, coarse, parallel stripes due to whitening of the large veins only, and usually extending the whole length of the leaf. The third type shows broad chlorotic bands affecting the veins and the tissues between, and either extending the full length of the leaf or, more usually, fading into dots or stipple stripes of various lengths. Sometimes the entire leaf bases are affected from side to side, or one or more broad bands may follow the sides of the midrib.

All attempts to reproduce the Trinidad disease by artificial inoculation from the diseased leaves failed, and several attempts to transmit it by means of *P. maidis* gave irregular results, the only successes being obtained in cage experiments in which the plants were grown in poor soil in pots. In one such test two plants and in another, one, became striped in 12 and 21 days, respectively, from the introduction of the insects from diseased plants.

A disease closely resembling maize stripe and also associated with infestation by *P. maidis* was also observed on sorghum.

Skovholt (O.) & Bailey (C. H.). **Some new facts about molds and bread.**—*Minnesota Agric. Exper. Stat. Bull.* 296, 12 pp., 3 figs. (1 on cover), 1933.

An investigation was carried out to ascertain the factors that favour the development of moulds on stored bread, a problem the significance of which has considerably increased since the introduction of paper wrappers impervious to moisture for loaves. Preliminary experiments, in which the moulds most commonly occurring on bread, namely, *Penicillium expansum*, *Aspergillus niger*, and *Rhizopus nigricans*, were used, showed that at a relative humidity below about 90 per cent. none of them made any growth of practical importance in seven days, while at humidities between 91·2 and 93·9 per cent. *A. niger* and *R. nigricans* produced a heavy growth, the development of *P. expansum* being somewhat less. It was also shown that the addition of 6 per cent. skim milk solids to the dough slightly reduced the rate and extent of mould growth on the stored loaves. While the figures do not suggest that dry skim milk is an effective inhibitor of mould development, the fact that it was shown to increase the moisture retentive capacity of bread prepared with it indicates that its use retards the formation of a moisture film between the crust and the wrapper, and thus affords some protection against the development of moulds inside the latter.

Further experiments established quite definitely that the common mould spores do not survive the usual bread baking treatment, and that the rate of mould growth was directly proportionate to the length of exposure of the loaves to dusty air during the cooling

process, and to the amount of inoculum carried in the air. It was also found that less mould developed on loaves cooled to 120° F. before wrapping than on those cooled to 92°, but both showed less mould growth than loaves wrapped at 135°. The latter led to conditions favourable to mould growth, but the less favourable conditions at the lowest as compared with the intermediate temperature were counterbalanced by the longer exposure to dust during cooling to 92°.

RUGGIERI (G.). **Marciume dei rametti di Arancio amaro prodotto da 'Sclerotinia' sp.** [Twig blight of sour Orange caused by *Sclerotinia* sp.]—*Boll. R. Staz. Pat. Veg.*, N.S., xiii, 1, pp. 140–142, 1 fig., 1933. [English summary.]

The author states that *Sclerotinia* twig blight of citrus is relatively uncommon in Sicily, where it is unlikely to become of any appreciable importance except in localities where owing to the rather cold winters the trees have to be covered and the nurseries planted in sheltered positions on soil rich in organic material. A brief description is given of the usual symptoms, followed by a fuller account of a case, observed on sour orange [*Citrus aurantium* var. *bigaradia*] and probably due to *S. sclerotiorum* [*R.A.M.*, x, pp. 118, 307], in which spheroidal, white or blackish sclerotia had encircled the base of the leaf stalks, causing the leaf and petiole to bend downwards. Where the leaf had already fallen, the sclerotia had formed on the leaf scar, and in some cases they also developed on the internodes, where they were elongated and almost fusiform in shape.

Control should be possible by the prompt removal and burning of the affected twigs.

RUGGIERI (G.). **Osservazioni sopra l'alterazione dei Mandarini prodotta dalla 'Cytosporina citriperda' Camp.** [Observations on the disease of Mandarins caused by *Cytosporina citriperda* Camp.]—*Boll. R. Staz. Pat. Veg.*, N.S., xiii, 1, pp. 143–150, 2 figs., 1933. [English summary.]

During the winter of 1932–3, mandarins [*Citrus nobilis* var. *deliciosa*] in the provinces of Catania and Syracuse, Sicily, and especially those growing in the vicinity of Mount Etna, were widely attacked by *Cytosporina citriperda* [*R.A.M.*, ii, p. 310]. This season was mild, humid, and cloudy, and owing to an exceptionally heavy crop, ripening was delayed by at least three weeks, to between the end of December and 10th January, at a period when the prevailing temperature and moisture conditions strongly favoured fungal attack. In the author's opinion, the fruit became susceptible to infection owing to these favourable meteorological conditions which led to a copious formation of pycnidia on the fruit and to physiological weakening of the trees as a result of the heavy yield.

A very similar disease of mandarins, 'melanosis', was reported by Trabut from North Africa in 1898 and attributed by him to *Septoria glaucescens*. The Italian organism is not a *Septoria*, but superficially it resembles one, the chief difference being the presence of the stroma which it forms under the epicarp and from which the pycnidia arise. That a stroma was also present in Trabut's

fungus is indicated by his description of it as presenting a densely woven mycelium under the epicarp and having confluent pycnidia. The spore measurements of *S. glaucescens* are 12 to 16 by 2·5 μ and those of *C. citriperda* (though ranging from 12 to 26 by 1·7 to 2·4 μ) are generally 10·5 to 16 by 2 to 2·75 μ; the spore length of *C. citriperda* varies greatly with the medium, reaching 30 μ on carrot agar.

The author concludes that the two organisms are very probably identical, in which case the correct name should be *C. glaucescens*.

Van Der Plank (J. E.). **Sooty blotch on Citrus.**—*Farming in South Africa*, viii, 86, pp. 195, 197, 2 figs., 1933.

Satisfactory results in the control of sooty blotch of oranges (*Gloeodes pomigena*) have been obtained in recent tests by immersion of the fruit for 30 to 60 seconds in a 5 to 6 per cent. solution of bleaching powder containing 33 to 37 per cent. available chlorine, followed by exposure to the air for 10 minutes to one hour [*R.A.M.*, xi, p. 105]. The cost of the bleaching, inclusive of labour, worked out at about one penny per case for Navel oranges in commercial practice in the Northern Transvaal.

Benton (R. J.). **Prevent mould decay in Oranges. Departmental experiments show how this can be done.**—*Agric. Gaz. New South Wales*, xliv, 6, pp. 451–454, 2 figs., 1933.

This note is prefaced by a table summarizing the results of experiments [a preliminary report on which has already been noticed: *R.A.M.*, x, p. 728] from 1926 to 1930, inclusive, at Gosford, and from 1928 to 1930 at Griffith, on the use of borax or sodium bicarbonate solutions for the control of mould decay of cold stored oranges (among which that caused by *Penicillium digitatum* is stated to be the chief in New South Wales). In 1930, when most rotting occurred, the percentage at Gosford of decayed fruits was reduced from 33·5 in the controls to 1·4 in the borax treated and to 7·1 in the sodium bicarbonate-treated oranges, the figures at Griffith being 12·9, 2·3, and 7·7, respectively. Particularly severe tests in 1932, in which oranges were artificially inoculated with *P. digitatum* through wounds and then kept wrapped at normal temperatures for at least two weeks, confirmed the efficacy of the borax treatment even when reduced to a strength of 5 per cent., with or without the subsequent application of paraffin. Sodium bicarbonate, as well as four proprietary mould preventives (including 'W 3', a substance used in several Californian packing houses), gave varying results, but proved to be less reliable on the whole than borax. The experiments also indicated that rinsing the fruit in water after treatment tends to reduce the efficacy of the treatment.

Ruggieri (G.). **Gummosi e intumescenze delle foglie di Arancio.** [Gummosis and swelling of Orange leaves.]—*Boll. R. Staz. Pat. Veg.*, N.S., xiii, 1, pp. 150–154, 2 figs., 1933. [English summary.]

In the winter of 1932, orange leaves in Sicily developed a form of gum spot, the upper surfaces showing chestnut-coloured, erumpent,

mammillate, lobed pustules surrounded by a yellow halo, and the lower ones light brown or yellowish patches associated with a reduced chlorophyll content of the mesophyll. Hyperplasia of the palisade tissue occurred, with discoloration of the epidermal and palisade cells due to an accumulation of gum in them. As the hyperplasia had developed while the leaf was still growing the epidermis had followed the growth of the underlying tissue without rupturing. The discoloration of the under surface of the leaf was due to necrosis and gummosis of the stomatal cells, though not all the stomata were affected. The cause of the condition is at present obscure, but it had evidently acted for only a short period. It is pointed out that the type of corky spot of citrus leaves figured by Penzig ('Studi botanici sugli Agrumi', Pl. ii, 1887) differs sharply from that referred to in the present paper and cannot be regarded as a true gum spot.

Van Roechoudt (L. L.). **Inspection phytosanitaire dans le nord du Kivu.** [Phytosanitary inspection in the north of Kivu.]—*Rev. Agrol. et Bot. du Kivu*, *1933*, 3, pp. 28–30, 1933.

The writer gives notes on the diseases encountered during his inspection of some forty coffee plantations in north Kivu [Belgian Congo], which included *Colletotrichum coffeanum* [*Glomerella cingulata*] and *Armillaria mellea* [*R.A.M.*, xi, pp. 159, 699].

Reydon (G. A.). **Een bladziekte bij de Koffie.** [A leaf disease of Coffee.]—*De Bergcultures*, vii, 27, pp. 758–762, 2 figs., 1933.

Grafted Robusta coffee plants of a clone of the 'Uganda' variety growing at both low and high altitudes in Java developed a leaf disease during the recent rainy season which proved to be due to a species of *Rhizoctonia*, probably *R.* [*Corticium*] *solani*, and which also attacked native Java coffee [*Coffea arabica*] bushes at altitudes of over 1,000 m. The disease was first seen in the Kaliwining experimental plantation, where a whole row of seven-year-old Uganda grafts was attacked, while the rest of the garden, including other clones of the same origin, was free from infection.

In the early stages the leaves show greyish-green to black, sharply defined, round to irregular spots between the lateral veins on both surfaces, the tissue round the line of demarcation being slightly sunken. In very damp conditions, as when leaves bearing lesions are placed in a moist chamber, a cobweb-like mycelium covers the spots and forms round pseudosclerotia, 1 to 1·5 mm. in diameter, in about a week. The centres of the lesions turn pale as they dry out and become torn. Affected young leaves are often malformed and look scorched. Some of the older Java trees were defoliated, and a top die-back developed on young plants of this variety in the same plantation, which was the only locality where serious injury was observed.

Cross-inoculation experiments with the *arabica* and *robusta* strains of the fungus gave positive results on both species. *Colletotrichum coffeanum* [*Glomerella cingulata*: see preceding abstract] developed on a number of the shrivelled spots caused by *C. solani* but gave entirely negative results in inoculation tests, all of which with *C. solani* were positive. Further investigations are necessary

to decide whether the leaf form of *C. solani* is identical with that commonly found as an agent of damping-off among coffee seedlings from six to ten months old.

Although the leaf disease is most prevalent during the rainy season, it may occur in the dry weather, the development of the fungus being very rapid during cool and dewy nights. Given the necessary degree of coolness and moisture, the leaf disease may even be found among bushes standing in the full sunlight. In general, the disease may probably be held in check by suitable cultural methods, but where severe infection is threatened a preventive application of Bordeaux mixture with an adhesive, e.g., resin-soda, may be advisable.

KADEN (O.). **Das Kaffeesterben in Angola, eine physiologische Welkekrankheit.** [The dying-off of Coffee in Angola, a physiological wilt disease.]—*Der Tropenpflanzer*, xxxvi, 4, pp. 139–146, 1933.

An account is given of a physiological wilt disease chiefly affecting a Robusta type of coffee, *Coffea canephora* var. *laurentii*, in Angola, Portuguese West Africa. The trees wilt and in severe cases die within a few days at the onset of the dry season (April to May), while in milder attacks they may partially recover though without regaining their original vigour. The symptoms are more acute in Amboim than in Cazengo, while in Dembos they have only been observed on a few trees of *C. arabica* at an altitude of 700 m. above sea level. Soil analyses [the results of which are tabulated] showed that the humus content of the soil around the affected trees was only 7·31 per cent. at a depth of 1 m. compared with 11·31 per cent. in healthy sites; corresponding reductions in pore volume and water-holding capacity were also registered. The writer has found the same disease in Costa Rica [*R.A.M.*, xii, p. 168], and there seems to be no doubt that the Angola trouble is also identical with the 'yellowing' of coffee in Kenya [ibid., x, p. 519]. In order to maintain a high humus content in the soil, suitable shade trees [a list of which, available in Angola, is given] should be planted. Gentle slopes should be chosen for the plantations, with adequate protection from wind, attention being also paid to green manuring, cover crops, and the control of weeds.

DRECHSLER (C.). **Morphological features of some fungi capturing and killing amoebae.**—*Journ. Washington Acad. Sci.*, xxiii, 4, pp. 200–202, 5 figs., 1933.

A large protozoan, provisionally identified as *Amoeba verrucosa*, was attacked in agar plate cultures from plantings of diseased rootlets and the like by a fungus characterized by rather short, somewhat tapering, sparsely branched, noticeably differentiated conidiophores bearing elongated bicellular conidia with an empty third cell in the form of an apical appendage nearly equal in length to the two living cells together. Capture was effected by the attachment of the amoeba to short, somewhat globose, yellowish, adhesive protuberances borne laterally on prostrate superficial hyphae. On perforation of the pellicle the hyphae formed an internal complex of swollen, ultimately septate elements by

dichotomous branching. A smaller amoeba was captured through adhesion to the prostrate, narrow, non-septate, hyphae of another fungus which bore on short, undifferentiated aerial branches unicellular, inversely flask-shaped spores with a short, empty basal stipe and 2 to 6 (usually 3 to 5) divergent, tapering, empty subapical appendages approximately equal in length to the single living cell. Three other fungi were observed to capture amoebae by similar methods, and were characterized by caducous, fusiform or acicular, continuous, hyaline conidia, and by yellow oospores, with sculptured, ridged external thickenings of the oospore wall. In all three species the oospore is produced through the fertilization of a terminal globose oogonium by a slightly expanded terminal antheridium borne on a branch arising from an adjacent hypha. In some cases the germ-tube from a conidium gives rise directly to a sexual organ, while in other instances it directly penetrates the host.

DRECHSLER (C.). **Morphological features of some more fungi that capture and kill nematodes.**—*Journ. Washington Acad. Sci.*, xxiii, 5, pp. 267–270, 4 figs., 1933.

Further details are given of the morphology of four more fungi with morphological similarities to those previously reported, found capturing and killing nematodes such as *Diploscapter coronatus*, *Cephalobus persignis*, and species of *Rhabditis*, *Diplogaster*, and *Bunonema* in agar cultures [*R.A.M.*, xii, p. 512 and next abstracts]. One of the four organisms differs from the others in having at first a non-septate mycelium which captures the worms by a pad of sticky material and produces globose conidia, mostly intercalary in the creeping hyphae and generally characteristic of the genus *Pythium*.

DRECHSLER (C.). **Several more fungi that prey on nematodes.**—*Journ. Washington Acad. Sci.*, xxiii, 7, pp. 355–357, 3 figs., 1933.

Further observations are made on the morphology of the fungi destroying nematodes (*Rhabditis* and *Cephalobus* spp.) in agar cultures [see preceding and next abstracts], and of the mode in which the prey is captured, i.e., by intramatrical, non-constricting hyphal loops or by anastomosing, adhesive, superficial constricting loops; in the latter case the nematode is virtually suffocated before the initiation of mycelial invasion. Since organs of capture are generally absent in pure cultures of the predacious Hyphomycetes hitherto isolated, it would appear that a tactile stimulus supplied in nature by living nematodes may be of importance in their development.

SHERBAKOFF (C. D.). **A new fungus parasitic on nematodes.**—*Mycologia*, xxv, 4, pp. 258–262, 1 pl., 1933.

Anulosporium nematogenum n. g., n. sp., recently found attacking nematodes of the genera *Aphelenchus*, *Cephalobus*, *Dorylaimus*, and *Rhabditis*, as well as the larvae of some minute flies [cf. preceding abstracts], is characterized by hyaline, septate hyphae, 1·7 to 2·2 μ in diameter outside the host, and 2·5 to 3·5 μ within it;

simple, sometimes septate conidiophores, 20 to 30 μ in length; and hyaline, usually triseptate conidia, 2·5 to 3·5 μ in diameter, forming closed rings 13 to 23, mostly about 18 μ in diameter, in which the insects are firmly caught.

POST (THELMA B.). **A new disease of Dahlias.**—*Journ. Washington Acad. Sci.*, xxiii, 4, pp. 203–208, 9 figs., 1933.

Diseased dahlia stems received from South Carolina in July, 1932, bore both the pycnidial and sclerotial stages of *Macrophomina phaseoli* (*Rhizoctonia bataticola*) [*R.A.M.*, xii, p. 201]. Sclerotia developed in three days in cultures of the mycelium present in the petioles, stems, and roots. Pycnidia appeared in one acid maize meal culture from sclerotium-containing tissue in 18 days, a formation of sclerotia preceding the appearance of the pycnidia. Spores from these pycnidia germinated readily, whereas the spores from pycnidia found on the host failed to germinate when transferred to various nutrient media, even though young pycnidia and spores were used [cf. ibid., vii, p. 62].

Spores from the pycnidia obtained in culture yielded further pycnidial cultures when sown on steamed dahlia stems or on pieces of epidermis from these stems placed on nutrient agar plates. Sclerotia also developed in these cultures. No pycnidia were formed in similar cultures on sweet clover [*Melilotus alba*], sunflower, and string bean [*Phaseolus vulgaris*] stems. It is not yet known whether the pycnidial stage of *M. phaseoli* in the present experiments arose as a saltant from the sclerotial fungus or from mycelium that may have been mixed with the sclerotia in the diseased tissue. In view of the rarity of the pycnidia in culture (this is stated to be only the third record) [cf. ibid., ix, p. 686] the former theory seems the more tenable. The strain producing both sclerotia and pycnidia has been repeatedly transferred in single-spored culture and has continued to form both pycnidia and sclerotia.

The pycnidia found in the epidermis of the dahlia stem measured 171 to 198 μ in diameter and the spores 18 to 25 by 7·2 to 9 μ; on potato dextrose agar the corresponding dimensions are 136 to 200 and 18·2 to 28 by 7·2 to 10·8 μ, respectively. The young pycnidium is thin-walled and composed of angular cells [ibid., vi, p. 757] and it becomes black and carbonaceous with age. The sclerotia found in the pith in nature ranged from 62 to 117 μ in diameter, the corresponding dimensions on potato dextrose agar being 40 to 80 μ. The dahlia fungus thus belongs in strain C of *R. bataticola* according to Haigh's classification [ibid., ix, p. 686; see also xii, p. 727]. The pycnidia varied greatly in shape and size in culture and showed a tendency to form several ostioles (up to four) except on steamed dahlia stems, on which only one ostiole developed, as in nature.

Discussing the taxonomy of the fungus, the writer points out that in 1904 D'Almeida and Da Camara described a fungus on *Dahlia variabilis* at Coimbra, Portugal, which they named *Macrophoma henriquesiana* (*Rev. Agron.*, ii, p. 218, 1905). The diameter of the pycnidia of this organism is given as 140 to 190 μ and the spore dimensions as 17 to 23 by 5 to 8 μ, and in these and other

particulars it approximates to *Macrophomina phaseoli* and is in all probability identical.

GREEN (D. E.). **A disease of Antirrhinums new to Great Britain.** —*Gard. Chron.*, xciv, 2433, p. 131, 1 fig., 1933.

A popular note is given on the symptoms of rust (*Puccinia antirrhini*) [*R.A.M.*, x, pp. 534, 742] of *Antirrhinum* [*majus*] in connexion with the first report of its occurrence in Great Britain. Specimens were sent from Kent on 2nd July to the Laboratory of the Royal Horticultural Society and the identification of the rust was confirmed by Dr. G. H. Pethybridge, of the Plant Pathology Laboratory of the Ministry of Agriculture. The rust has been known for many years in the United States and Bermuda, where it causes considerable losses.

DU PLESSIS (S. J.). **Drie nuwe siektes van blomtuinplante.** [Three new diseases of ornamentals.]—*Ann. Univ. Stellenbosch.*, xi, Ser. A, 2, pp. 1–16, 5 figs., 1933. [English summary.]

Gaillardia sp. at Stellenbosch, South Africa, has recently (1932-3) been observed to show a concentric, brown to grey spotting of the leaves, sometimes also affecting the stems and pedicels, caused by *Phoma gaillardiae* n. sp. The fungus is characterized by dark pycnidia, 113·6 to 165·4 by 99·4 to 156·2 μ in diameter, with smooth, hyaline, biguttulate, cylindrical to subelliptical or subfusoid conidia, 4·8 to 8·9 by 1·4 to 2·2 μ, borne on simple, filiform conidiophores, 4·5 to 8·2 by 1·3 to 1·7 μ.

Chrysanthemum sp. in the Paarl district suffers from a leaf disease characterized by circular brown spots with a dark brown margin, sometimes encircled by a pale yellow halo. The causal organism, *Epicoccum chrysanthemi* n. sp., forms hypophyllous or amphigenous, erumpent, dark sporodochia, 56·8 to 156·2 μ in diameter, and dark, globose, densely echinulate, subrectiform, unicellular conidia, 13 to 25·2 μ, borne on dark, simple, broadly clavate conidiophores, 8·2 to 16·7 by 5·1 to 8·5 μ.

The so-called 'black foot' disease of *Stapelia*, *Trichocaulon*, *Caralluma*, *Duvalia*, *Hoodia*, *Huernia*, *Sarcophagophilus*, and *Tavaresia* spp. in the Karoo and other districts may be recognized by a black striped discoloration of the stem bases at or near soil level, which ultimately extends right round the crown and kills the plants. The causal organism, *Triposporium stapeliae* n. sp., is characterized by numerous conidia, at first irregularly, clavate to subclavate, with narrow bases and broad, round apices, forking at maturity into two apices (Y form), the quinqueseptate base measuring 23·3 to 34 μ in length and the two bi-, rarely triseptate arms 8·5 to 14·7 μ, the total size of the conidium being 23·5 to 45·6 by 13·6 to 17 μ. These organs are borne on long, brown, simple conidiophores, sometimes forked at the mostly subpedicellate apex and then often nodular at the angles, 51 to 147·3 by 4·8 to 6·9 μ. The fungi are furnished with Latin diagnoses. The conditions favouring infection by them are discussed and some directions given for their control.

Fr. **Die Weisstüpfligkeit der Luzerne.** [The white stippling of Lucerne.]—*Deutsche Landw. Presse*, lx, 29, p. 371, 1933.

Of recent years lucerne crops in Germany have been affected by a white stippling of the leaves [cf. *R.A.M.*, viii, p. 510]. The spots begin to develop round the upper leaf margin, whence they spread in increasing numbers over most of the surface. The diseased plants are irregularly distributed throughout the stands, with a tendency to predominate near the edge of the field. The roots of affected plants show symptoms of necrosis, sometimes extending to the pith of the roots and stems. The primary cause of the trouble seems to be injury to the roots through frost, the white stippling of the foliage being merely an expression of transpirational disturbances due to necrosis. No trace of insect or fungal injury could be detected in the spots.

Weber (G. F.). **Stem canker of Crotalaria spectabilis caused by Diaporthe crotalariae, n. sp.**—*Phytopath.*, xxiii, 7, pp. 596–604, 4 figs., 1933.

Crotalaria spectabilis at Gainesville and two other localities in central Florida was observed in 1930 to be attacked by a stem canker, characterized by wood-brown (Ridgway) lesions, becoming zonate by the formation of greyish-white mycelial bands beneath the epidermis. Infection generally occurs through leaf or branch scars, and once within the stem the fungus, which is described [with an English diagnosis] as *Diaporthe crotalariae* n. sp., rapidly invades all parts, sometimes killing up to 30 per cent. of the plants in a field.

D. crotalariae is characterized by globose to lenticular, black, pseudoparenchymatous perithecia, embedded in stromata between the bark and wood, with walls 220 to 380 μ in diameter; erumpent beaks, 1 to 2 mm. long, tapering, black, with brownish, rounded tip, hairy on the surface; subsessile, elongate-clavate, aparaphysate asci, average size 34·01 by 6·85 μ; and irregularly biseriate, hyaline, ellipsoid, obtuse, bicellular ascospores, 9·12 to 12·31 by 2·28 to 3 μ, average 10·95 by 2·5 μ. The pycnidial stage of the fungus, the genetic connexion between which and *D. crotalariae* was established by single ascospore cultures, is named *Phomopsis crotalariae* n. f. nom. and is characterized by subepidermal, irregular to subglobose, scattered, black, thick-walled, simple or chambered, pseudoparenchymatous pycnidia, 200 to 450 μ in diameter; ovate to elongate, hyaline, guttulate, unicellular pycnospores, 5·9 to 10 by 1·9 to 2·8 μ, average 7·73 by 2·28 μ; simple, hyaline, tapering sporophores, 15·4 to 26·6 μ long; and rare, slender, hyaline, hooked stylospores, 16·6 to 30·94 by 1·8 to 2·3 μ.

The pathogenicity of the fungus was established by successful inoculations of *C. spectabilis* with pycnospore and ascospore suspensions from pure cultures and with fragments of the mycelium applied to fresh leaf scars or through wounded axillary buds. Symptoms were visible on the neighbouring part of the stem after 14 days, and were identical no matter which stage of the fungus was used. Pycnidia appeared in four weeks and perithecia several weeks later, after the diseased parts were cut out and placed in moist chambers.

Weston (W. H.). **A new Sclerospora from Nyasaland.**—*Phytopath.*, xxiii, 7, pp. 587–595, 2 figs., 1933.

This is an extended account [accompanied by a Latin diagnosis of the fungus] of *Sclerospora butleri* on *Eragrostis aspera* in Nyasaland, a preliminary note on which has already been published [*R.A.M.*, x, p. 389]. So far the organism is known only in the locality of its original detection, but since the host is common throughout tropical Africa, it is thought probable that a more intensive survey will reveal a wider distribution. *E. aspera*, though a troublesome weed in coffee plantations and other cultivated areas, is a valuable fodder and severe attacks by *S. butleri* might therefore assume considerable importance. The taxonomy of the fungus is briefly discussed.

Thomas (H. E.) & Parker (K. G.). **Fire blight of Pear and Apple.**—*Cornell Agric. Exper. Stat. Bull.* 557, 24 pp., 1 col. pl., 9 figs. (1 on cover), 1933.

This bulletin represents an attempt to summarize, for the use of fruit growers, the most up-to-date knowledge of fire blight (*Bacillus amylovorus*) of pears and apples [*R.A.M.*, xii, p. 700], with particular reference to its symptomatology. Observations in 1930 and 1931 indicated that *Crataegus monogyna* [*C. oxyacantha*] and *C. punctata* are natural hosts of *B. amylovorus*, while several other species of the genus can be artificially infected. In discussing control measures, the authors give details of their own experience from 1926 to 1931, inclusive, in a western New York orchard of some 3,000 pear trees, with a slight admixture of apple trees, in which they obtained fair to good control by means of a systematic removal each year of all infected organs from the trees, at an average annual cost scarcely greater than that of a single spray application in the same orchard.

Ludwigs (K.). **Das Fusikladium in seiner Abhängigkeit von Klima, Standort, Obstarten und -sorten.** [*Fusicladium* in its relation to climate, habitat, and kinds and varieties of fruit.] —*Obst- und Gemüsebau*, lxxix, 7, pp. 101–102, 1933.

A brief, general account is given of the occurrence of apple scab (*Fusicladium*) [*Venturia inaequalis*] in relation to climatic, local, and varietal factors, with notes on appropriate spraying schedules, reference being specially made to Loewel's investigations of the disease in the Hamburg district [*R.A.M.*, xii, p. 297].

Moore (M. H.). **Some incidental effects of routine scab-sprays, with special reference to Apple fruit sawfly control. A sidelight on the interpretation of field spraying experiments.**—*Ann. Rept. East Malling Res. Stat. 1st Jan. 1932 to 31st Dec. 1932*, pp. 90–98, 1933.

Applications against apple scab [*Venturia inaequalis*: *R.A.M.*, xii, p. 297] of Bordeaux mixture and lime-sulphur with and without lead arsenate at East Malling gave control of sawfly (*Hoplocampa testudinea*), and, on Cox's Orange Pippin trees, brown rot (*Sclerotinia fructigena*) [ibid., x, p. 250] was also always less on the sprayed trees when lime-sulphur was the fungicide used, though

pink bud applications of Bordeaux mixture caused severe cracking and russeting with the result that *S. fructigena* penetrated the cracks and some of the sprayed trees showed more brown rot than the controls. Post-blossom applications of Bordeaux mixture caused surface russeting but very little cracking, and brown rot infection was slight.

MOORE (M. H.). **Spraying trials against Pear scab (Venturia pirina). Some practical and theoretical aspects of the interpretation of the results.**—*Ann. Rept. East Malling Res. Stat. 1st Jan. 1932 to 31st Dec. 1932*, pp. 99–108, 1 plan, 1933.

The results of the author's spraying experiments at East Malling in 1931 and 1932 for the control of pear scab [*Venturia pirina*: *R.A.M.*, xii, p. 639] are further discussed and a detailed account, supported by tables, is given of the methods by which the efficiency of the various spraying programmes was assessed.

Two distinct methods of grading the fruits with regard to scab infection were employed. In the first or 'counting' method the percentage of scabbed fruits was alone considered and the spraying efficiency was expressed by the percentage reduction of scabbed fruits in the sprayed trees as compared with the controls. Thus, if 50 per cent. of the control fruits but only 10 per cent. of those sprayed were scabbed the efficiency was 80 per cent. In the second or 'category' method the total area of scab infection on the fruits was calculated and the percentage reduction of this on the sprayed trees as compared with the controls gave the measure of efficiency. The fruits were divided into five categories, unscabbed and with four numerical degrees of scabbed areas from light (0–$\frac{1}{4}$) to heavy (1–2), respectively. The number of fruits in each category was multiplied by the category mean (e.g., $\frac{1}{8}$ for light and 1·5 for heavy) to give the total scab area (scab-equivalent) of the sample. This was multiplied by a constant (100) to avoid excessive decimals. In the case cited the scab-equivalent on the controls was 36·5 and on the sprayed trees 1·25, the spray efficiency being thus 97 per cent.

Of these two methods the second is considered to be the more accurate, but the use of both may give valuable indications. Two different fungicides may give the same scabbed area, but in one a number of small spots may be distributed on a great many fruits while in the other there are large spots on fewer fruits. The larger number of quite clean fruits may render the second the more valuable commercially.

Most of the practical results of the tests have been mentioned in the previous notice [loc. cit.], but the following may be added. A considerable reduction in the number of fruits reaching maturity was caused in 1931 by the use of burnt lime Bordeaux mixture as compared with the controls or the hydrated lime Bordeaux, the latter giving the largest number. The loss from the burnt lime Bordeaux was undoubtedly due to blossom injury caused by the pre-blossom application, which inadvertently was deficient in lime. In 1932 neither type of Bordeaux caused damage. The figures obtained in both years are considered to demonstrate the greater

commercial value of Bordeaux than lime-sulphur where scab control alone is concerned.

TANAKA (S.). **Studies on black spot disease of the Japanese Pear (Pirus serotina Rehd.)**—*Mem. Coll. Agric. Kyoto Imper. Univ.* 28 (Phytopath. Ser. 6), 31 pp., 2 pl., 3 figs., 2 graphs, 1933.

A comprehensive account is given of the writer's studies on the black spot disease of Japanese pears (*Pyrus serotina*), which is prevalent throughout Japan and Korea, especially on the superior Nijisseiki variety; other susceptible sorts include Doitsu, Hakata-ao, and Meigetsu, while Inamura-aki, Taihaku, Waseaka, Chōjūrō, and Okusankichi are highly resistant. Several papers on this disease have appeared in Japanese, since it was first reported by Bokura in 1917.

The causal organism, which is named *Alternaria kikuchiana* n. sp. (with English and Latin diagnoses), appears to enter the fruit and the young leaves and shoots through the cuticle, stomata, and lenticels. The first small, black specks develop on the fruit in May or June, later expanding and coalescing into large, irregular, blackish-brown, circular lesions, with conspicuous black, concentric rings. The diseased fruit makes uneven growth, often cracks, and finally drops. The young leaves and petioles are similarly attacked at the same time as the fruit. On the current year's shoots the black specks extend into oblong, slightly sunken streaks with concentric rings, which finally kill the shoots.

A. kikuchiana is characterized by olivaceous-brown hyphae, 3 to 6 μ in width, which rapidly produce a brown pigment (like melanin) on penetration of the host. The fasciculate, simple or branched, olivaceous-brown conidiophores bear oblong, ovate, or muriform, occasionally obclavate or packet-shaped conidia, with 1 to 10 transverse and 1 to 3 longitudinal septa, sometimes echinulate, often short-beaked, occasionally catenulate, and 9·5 to 69·5 by 6 to 22 μ in diameter (on the host). Four strains of the fungus were encountered: I and IV are distinguishable by producing relatively few conidia on the host as compared with II and III; strain II showed the most vigorous mycelial growth, sporulation, and pigment production. Conidia were produced in abundance by all the strains in culture on pear decoction agar. Saltation was frequently observed in strains II and III, particularly at fairly high temperatures, two types of mutants being distinguished, the mycelial and conidial, as described by R. Bonde for *A. solani* [*R.A.M.*, viii, p. 737].

The optimum temperature for the growth of *A. kikuchiana* appears to be about 28° C. The conidial strains tend to make vigorous growth at higher temperatures than the mycelial. The optimum hydrogen-ion concentration for growth is about P_H 6·0. Infection was shown to occur at a relative atmospheric humidity exceeding 90 per cent. at a temperature range of 24° to 30°. The filtrate of culture solutions of *A. kikuchiana*, passed through Chamberland's filter F, contains a toxic substance which was found to be responsible for the spotting of the fruit. This substance lost its virulence on heating to 100°.

The taxonomy of the fungus is briefly discussed. A comparative study was made of its morphology and host relations and those of *A. bokurai* M. Miura (*Southern Manchuria Railway Co., Ind. Proc.*, xxvii, p. 513, 1928), the agent of a similar disease on Chinese pears in Manchuria. The two fungi were found to differ both in conidial dimensions and pathogenicity, *A. kikuchiana* being unable to attack the Chinese pear, while *A. bokurai* failed to infect the Nijisseiki Japanese variety.

Overholser (E. L.), Overley (F. L.), & Claypool (L. L.). **Cork or drought spot in Apples and Pears.**—*Better Fruit*, xxxvii, 10, pp. 5–6; xi, p. 11, 2 figs., 1933.

An account is given of the physiological conditions described in apples as 'cork' and 'drought' spots [cf. *R.A.M.*, ix, p. 322]. In 'cork' the brown lesions are beneath the skin or are deeply seated in the flesh, usually in association with the larger vascular bundles, and the affected fruits are usually normal in appearance at first but may become deformed later. In 'drought spot' the dead tissue appears just beneath the skin as irregular spots, brown streaks occasionally following the vascular bundles deeper into the flesh, and the spots at first may exhibit a water-soaked appearance. Similar lesions were observed affecting pears (chiefly of the d'Anjou variety) in central Washington in 1928 and again in 1931, when they resulted in many instances in the rejection of over 50 per cent. of the crop.

In a discussion (based mainly on field observations) of the factors involved in the causation of these troubles, it is stated that they are probably produced by environmental conditions and cultural practices interfering with a normal supply of water to the developing fruits. Amongst these are (1) a light crop, which favours a luxuriant development of foliage causing an exaggerated withdrawal of water from the fruits during periods of excessive transpiration [loc. cit.]; it was observed in 1931 that one portion of an orchard which had been severely defoliated owing to insect injury, produced a much lower percentage of fruit with cork spot than the less defoliated parts of the orchard. (2) High temperatures during the growing season. (3) Periods of low relative humidity. (4) Strong drying winds. (5) Too close planting, which reduces the mass of soil available to each individual tree. (6) Growth on soils with inadequate moisture-holding capacity. (7) Insufficient or excessive irrigation. (8) Root injury caused by low soil temperatures, or by excessively deep disking or subsoiling. There was also some evidence that the use of Japanese pear seedlings (believed to be *Pyrus serotina*) as stocks for pears is a contributing factor to the development of cork spot.

Goidanich (G.). **Un deperimento dei Susini.** [A wilt of Plums.] —*Boll. R. Staz. Pat. Veg.*, N.S., xiii, 1, pp. 160–174, 8 figs., 1933. [English summary.]

In this account of a wilt of plum trees (chiefly affecting the Burbank variety) reported from various parts of Italy, the author states that affected trees sometimes come into leaf, and may even blossom, in winter. When vegetation begins, the leaves open

before the flowers, or both may appear simultaneously. The foliage of the affected trees is chlorotic, the crop is small and does not ripen completely, and death ensues in two or three years.

From the trunk to the extremities of the small branches the phloem shows rusty-red areas which may appear all around the limb. The discoloration occasionally reaches the cambium, but generally it does not extend so far, with the result that the meristematic tissues function normally, new wood and phloem being produced and in turn becoming discoloured. The outermost part of the phloem is also usually unaffected. The alternation of darkened and normal zones in the phloem indicates that the cause of the condition continues to act only during certain periods which are not brief and irregular as in the case of frost damage. The old, necrosed phloem is separated from the new, healthy part by a corky layer, but if this does not form completely the necrosis extends to the cambium, and the wood may, exceptionally, become affected.

The cause of the condition is at present obscure, all attempts to isolate a parasitic organism from affected material having given negative results. In some respects the wilt resembles closely the type of apricot apoplexy reported by Chabrolin from the Rhone valley [*R.A.M.*, viii, p. 656; ix, p. 255; xi, p. 791].

Bennett (C. W.). **Further observations and experiments with mosaic diseases of Raspberries, Blackberries, and Dewberries.**—*Michigan Agric. Exper. Stat. Tech. Bull.* 125, 32 pp., 5 figs., 1 diag., 1932.

A detailed, tabulated account is given of the writer's observations and experiments in Michigan on raspberry, blackberry, and dewberry [*Rubus* spp.] mosaic, of which two forms are distinguished, red and yellow [*R.A.M.*, x, p. 530; xii, p. 204]. The former is characterized by a low temperature maximum for symptom expression and by mottling and necrosis of the leaf petioles and cane tips. It varies in severity from very mild mottling of the first spring leaves to rosetting and severe necrosis of black raspberries [*R. occidentalis*], causing the death of the plants in a few years. Yellow mosaic, on the other hand, is most evident at the height of summer, when distinct yellowing with practically no necrosis develops. The two types are often found in combination and the possibility that they may be due to strains of a single virus is not excluded. In red varieties affected by yellow mosaic, mottling is accentuated by the presence of red mosaic at temperatures too high for the latter alone to produce symptoms. In black varieties cane striping develops as a result of mixed infection by the two types.

The red and yellow mosaics vary in the rate of dispersion, the former moving to all parts of the plant during the first season, while the latter, as a rule, does not progress from the inoculated cane to others of the same hill until the spring following infection. On experimental plants, the red virus moved downwards from the tips of first-year black raspberry canes at a rate of some 0·2 inch per hour. Neither virus moved through a portion of the stem from which a ring of bark had been excised.

The chief agent of mosaic dissemination is considered to be the aphid *Amphorophora rubi*; *A. rubicola* and *A. sensoriata* are of secondary importance, though apparently capable of transmitting, while *Aphis rubiphila* is an uncertain and, in any case, a very rare vector. *Amphorophora rubi* occurs in large numbers on the Latham, King, and St. Regis raspberry varieties, as well as on the wild red raspberry (*R. strigosus*), and spreads rapidly from the two first-named to adjacent black varieties. This aphid acquired the yellow mosaic virus in a feeding period of two hours and transmitted it to healthy plants during the next forty-eight, while the red virus was acquired in twelve hours and transmitted during the next twelve. Aphids subjected to brief periods of feeding on healthy plants lost the red virus and probably also the yellow one, suggesting that transmission is mechanical. The insects act as vectors of both types of mosaic at all stages of their development.

HARRIS (R. V.) & GRUBB (N. H.). **The commercial control of Raspberry-mosaic disease.**—*Ann. Rept. East Malling Res. Stat. 1st Jan. 1932 to 31st Dec. 1932*, pp. 149–151, 1933.

An intensive study of raspberry mosaic [see preceding abstract] at East Malling since 1924 has shown that the direct control of the disease by roguing out the affected stools in established fruiting plantations is uneconomic, and that a practical scheme of control should aim at providing the grower with virus-free supplies of cane. Commercial plantations should no longer be regarded as a source both of fruit and of canes for planting.

In 1927, experimental cane nurseries for the production of virus-free Lloyd George canes were started at East Malling, and in 1930, six daughter-nurseries were planted in various places, each with 300 canes from the original nurseries. These were inspected twice in 1931 and twice in 1932, and about six mosaic-infected stools were removed from each during the two-year period, the labour required being negligible in relation to the output, which in 1932 ranged from 1,800 to 9,500 canes per nursery (average, 5,600). The demand for virus-free canes from growers wishing to lay down such nurseries themselves and from those requiring reliable and uniformly vigorous canes for fruiting plantations greatly exceeded the supply. Full directions are given for the planting and maintenance of such nurseries.

HARRIS (R. V.). **The infection of Raspberry fruits by the cane-spot fungus.**—*Ann. Rept. East Malling Res. Stat. 1st Jan. 1932 to 31st Dec. 1932*, pp. 86–89, 1 pl., 1 fig., 1933.

In 1932, a serious deformation of the fruits of some varieties of raspberries, especially Baumforth Seedling B, was reported from several parts of Great Britain. The affected fruits bore acervuli of the *Gloeosporium* [*venetum*] stage of *Plectodiscella veneta* [*Elsinoe veneta*: *R.A.M.*, xi, p. 724].

The infected drupels were usually grouped together and showed every degree of deformation. Berries slightly attacked just before ripening appeared to be normal, except that two or three of the drupels were small and pale, but where heavy infection had taken

place soon after fertilization much of the mature fruit consisted of minute, dry, withered drupels.

On the new canes of the affected varieties the attack was exceptionally slight and due to infection after late July, but the fruiting canes were heavily spotted on the laterals and pedicels. This incidence indicated that the main wave of ascospore infection instead of taking place as usual between late April and the end of May, during the initial stages of the current year's cane, had occurred while the fruits were maturing. Optimum conditions for infection (consisting in warm weather with intermittent rain and sun) did not prevail during 1932 until late in July. In Scotland (where picking begins about one month later than in England) the earliest pickings were more severely affected than the late ones.

Hitherto it has been assumed that a heavy reduction in the crop of susceptible raspberry varieties from cane spot is chiefly due to injury caused by severe infection of the new canes of the previous year in April and May, with the result that spraying, in any one year, has been carried out to protect the following year's crop. The experience of 1932 shows, however, that under certain seasonal conditions the brunt of the infection is borne directly by the fruits, with considerable injury to the current year's crop. This type of injury provides an additional reason for the yearly application of a delayed-dormant and pre-blossom spray [cf. ibid., x, p. 804].

Dearness (J.) & Foster (W. R.). **Anther and stigma blight of Loganberry.**—*Canadian Journ. of Res.*, ix, 1, p. 43, 1 pl., 1933.

In the spring of 1932 the junior author observed a white fungus on the anthers and stigmas of loganberries (*Rubus loganobaccus*) in the Royal Oak and Gordon Head districts, Vancouver Island, British Columbia. The pollination of the drupelets was prevented and deformation of the fruit resulted, causing an estimated loss of 3 to 5 per cent. of the crop. The fungus in the distorted flowers was found to agree with *Hapalosphaeria* (*Paepalopsis*) *deformans* Syd. (*Ann. Mycol.*, vi, p. 301, 1908), both the hyphal form and the pycnidial being present. One anther contained 56 pycnidia, each with a multitude of smooth, hyaline, globoid spores, 3 to 4 μ in diameter. It is believed that this Asiatic parasite of the raspberry reached the American continent by way of the North-west.

Massee (A. M.). **Further observations on the Strawberry Tarsonemid mite (Tarsonemus fragariae Zimm.).**—*Ann. Rept. East Malling Res. Stat. 1st Jan. 1932 to 31st Dec. 1932*, pp. 117–131, 3 pl., 1933.

Royal Sovereign strawberries at East Malling which had been completely freed from infestation by mites (*Tarsonemus fragariae*) gradually died during the following season. It is considered to be possible that they were affected by the 'yellow edge' virus disease [*R.A.M.*, xii, p. 519], the symptoms of which would be masked by the effect of heavy mite infestation. The possibility that this mite is a vector of the virus is being investigated.

CRÜGER. **Vorzeitiges Absterben der Johannisbeerblätter.** [The premature dying-off of Currant leaves.]—*Die Kranke Pflanze*, x, 7–8, pp. 106–107, 1 fig., 1933.

Leaf spot of currants (*Pseudopeziza ribis*) [*R.A.M.*, xi, p. 799; xii, pp. 519, 705] is stated to cause heavy damage every summer in the Königsberg district of Prussia, where the red and white Versailles and Fag's Fruitful are accounted susceptible, while a high degree of resistance is shown by the red Dutch and Erstling von Vierlanden varieties. Not only is the current season's harvest greatly reduced by the disease, but the bushes become progressively weaker with each annual attack and finally die. Good control has been effected by an application of 0·8 per cent. Bordeaux mixture shortly after flowering, at a cost of Pf. 1·5 per bush [cf. ibid., xii, p. 640]. In certain circumstances additional treatments before flowering and 14 days after the post-blossom application may be indicated, but in no case should the bushes be sprayed during the flowering period.

Leaf scorch of currants may be due either to factory exhalations, keen, drying winds, shortage of potash, or excess of chlorine in the soil [ibid., xi, p. 463]. The leaf margins of plants affected by potash deficiency tend to turn blackish, whereas in the case of chlorine excess a rust-brown tinge is assumed. Potash should be applied in the form of potassium sulphate (3 kg. per 100 sq. m.), and not in that of kainit or potash salt.

Both *P. ribis* and leaf scorch may also affect gooseberries, on which they should be combated as described above.

WARDLAW (C. W.). **Panama disease. A review of the occurrence of Panama disease on the Cavendish or Dwarf Banana in the Canary Islands.**—*Trop. Agriculture*, x, 6, pp. 151–154, 1933.

This paper is mainly based on the information contained in Del Cañizo's and Sardiña's recent communication on the Panama disease (*Fusarium oxysporum* f. 3 and f. 4 Wr.) of the Cavendish banana (*Musa cavendishii*) in the Canary islands, which has already been noticed in this *Review* [*R.A.M.*, xii, p. 381].

PARK (M.). **Anthracnose of Plantains.**—*Trop. Agriculturist*, lxxx, 6, pp. 387–388, 1 col. pl., 1933.

A brief popular account is given of a form of anthracnose (*Gloeosporium musarum*) [*R.A.M.*, xii, p. 40] of unripe plantains [*Musa paradisiaca*] in Ceylon, which is stated to be commonest in wet weather and to appear soon after the fruits have set. While usually infection starts from the distal end of the fingers, presumably through the flowers, occasionally the rachis of the bunch becomes infected, the disease then spreading into the immature fruits through the stalk end. In both cases the diseased fruit turns black from the point of attack, shrivels and dries, without becoming detached from the rachis. Though sometimes the whole bunch may be affected, more commonly only one or two hands are involved. So far as the author is aware this form of the disease, on unripe fruit, is known to occur only in Ceylon and in India.

At present the disease is not of economic importance in Ceylon, since it attacks chiefly the cooking variety known as the Ash

Plantain which appears to be considerably more susceptible than any of the other varieties commonly grown in that island. Brief notes are given on the control of the trouble by the removal of the first infected parts and spraying with copper fungicides, in case this should prove necessary.

PETHERBRIDGE (F. R.). **Dusting for pest and disease control in the United States and Canada.**—*Journ. Min. Agric.*, xl, 3, pp. 209–215, 1933.

This is a brief report of the observations made by the author during his visit from April to June, 1931, to the United States and Canada, on the results obtained there in the control of fungal diseases and insect pests of fruit trees by means of fungicidal and insecticidal dusts. Much of the information regarding the former has already been noticed from time to time in this *Review*.

MARTIN (H.). **Studies upon the copper fungicides. II. Some modifications of Bordeaux mixture designed to overcome practical difficulties in its application.**—*Ann. of Appl. Biol.*, xx, 2, pp. 342–363, 1933.

This is a detailed account of laboratory and field experiments [a brief reference to which was made in a previous communication: *R.A.M.*, xi, p. 465] conducted in 1931 and 1932 at the South-Eastern Agricultural College, Wye, to test the efficacy and ascertain the drawbacks of two modifications of Bordeaux mixture intended to overcome certain disadvantages inherent in the latter, especially its inferior fungicidal action when applied as a heavy spray or drench instead of a fine mist, and to allow of the incorporation in it of contact insecticides. The first of these modifications consists in the addition of 0·75 per cent. of concentrated sulphite lye (60° Tw.) to the lime suspension before the stock copper sulphate solution is poured into it, and the second in the addition to the lime suspension of an emulsion produced by agitation of a mixture of a glyceride oil [ibid., xii, p. 576] and the copper sulphate solution. The name suggested for the first modification is Bordeaux-sulphite lye, and for the second oil-Bordeaux, to distinguish it from the combination of Bordeaux mixture and oil emulsion prepared with casein or other emulsifier, which is commonly known in America as 'Bordeaux-oil'. In the formulas giving the strength of the latter combination (e.g., 1–10–15–100) the first figure indicates the quantity in gallons of the glyceride oil added to the mixture.

The results of comparative field trials of the two preparations in the control of potato blight [*Phytophthora infestans*], apple and pear scab [*Venturia inaequalis* and *V. pirina*], hop downy mildew (*Pseudoperonospora humuli*), and, with the addition of a contact insecticide, of the apple sawfly (*Hoplocampa testudinea*) and the hop-damson aphis (*Phorodon humuli*), showed, in the case of the fungal diseases, that both, used as a wash, were as effective as lighter mist-like application of Bordeaux mixture; the fungicidal efficacy of the oil-Bordeaux emulsion was in some cases equal to that of a Bordeaux mixture containing double the amount of copper sulphate and lime. In combination with nicotine both modifications controlled the insects as efficiently as nicotine-soap

wash. It was also noted that the application of large quantities of the modified mixtures did not cause greater leaf injury or fruit russeting than lighter applications of Bordeaux mixture. Finally, it is pointed out that the possibility of using sprays of a larger volume, sufficient to drench the foliage, renders the application of the modified Bordeaux mixtures easier and more rapid than the usual mixture.

Estimations (by a method which is described) of the amounts of copper retained on the foliage after spraying [which are shown in comparative tables] showed that the use of oil improves the retention of the spray deposit, a fact which allowed of reducing the content in copper sulphate and lime of the oil-Bordeaux emulsion to half of that in the Bordeaux mixture used in the comparative tests.

THOMAS (R. C.). **A phenol-coefficient study involving bacterial plant pathogens.**—*Ohio Agric. Exper. Stat. Bull.* (Tech. Ser.) 10, pp. 3–14, 1932. [Abs. in *Chem. Abstracts*, xxvii, 18, pp. 4554–4555, 1933.]

A method is outlined for the determination of phenol coefficients of bactericides with Bacto nutrient agar, P_H 7·3, and Bacto nutrient broth, P_H 6·8, as the standard media. The compounds possessing the highest toxic efficiency were the mercury derivatives, mercuric chloride, metaphen, mercury ethyl chloride, and merthiolate [*R.A.M.*, xi, p. 428]. Sulphur derivatives showed greater toxicity to plant than to animal pathogens.

MORSTATT (H.). **Bibliographie der Pflanzenschutzliteratur: das Jahr 1932.** [Bibliography of plant protection literature for the year 1932.]—*Biol. Reichsanst. für Land- und Forstwirtsch.*, Berlin-Dahlem, 259 pp., 1933.

This bibliography of the German and foreign literature published during 1932 on different aspects of phytopathology and plant protection has been compiled on the usual lines [*R.A.M.*, xi, p. 665].

HOPKINS (J. C. F.). **Plant disease and environment in Southern Rhodesia.**—*Trop. Agriculture*, x, 6, pp. 172–177, 1933.

This paper represents an effort to correlate the epidemiology of the diseases attacking cultivated crops in Southern Rhodesia with the environmental conditions prevailing there. The results of the author's observations would indicate that, while climatic factors appear to play a predominating part in the outbreak and development of the diseases, their effects are frequently modified to a greater or lesser extent by subsidiary, but none the less important factors, such as the constitution, whether native or European, of the local population, and also the degree of adaptability of recently introduced crops to their new surroundings. This view is substantiated by field observations and pot experiments on wildfire (*Bacterium tabacum*) and angular spot (*Bact. angulatum*) of tobacco; dry rot (*Diplodia zeae*) and seedling blight (*Gibberella saubinetii* and other fungi) of maize; angular spot (*Bact. malvacearum*) and internal boll rot (*Nematospora coryli*) of cotton; and a few other diseases of lesser commercial importance, all of which

should be easily controllable under the climatic conditions of the colony, while in fact they are perpetuated from year to year owing to the lack of initiative exhibited by some growers and the failure to take adequate steps, such as seed treatment or sanitation of the fields, to keep them in check.

SMITH (K. M.). **Recent advances in the study of plant viruses.** —xii + 423 pp., 1 col. pl., 67 figs., London, J. & A. Churchill, 1933.

The subject-matter dealt with in this attractively got up and handy volume gives a survey of the present position of the knowledge of plant viruses [cf. *R.A.M.*, xii, p. 647], and is intended also to serve as a student's reference book until the progress and correlation of knowledge allows a more comprehensive treatise to be written. Within these limits the subject is exhaustively treated, each chapter being followed by a full bibliography of the relevant original work, a large proportion of which has been noticed in this *Review*. Eleven chapters are given to a general account of the symptoms, properties, transmission, physiology, etc., of virus diseases, their relation to insects being very fully discussed. A chapter on potato virus diseases and two on those of other plants, classified according to the hosts, terminate the book. A special feature is the frequent comparisons made between plant and animal viruses. A useful glossary of the technical terms used in virus investigations is appended. The illustrations are numerous and the letterpress clear and attractively written. The book is one that will be of great interest and value to all plant pathologists.

BULLER (A. H. R.). **Researches on fungi. Volume V.**—xiii + 416 pp., 174 figs., London, Longmans, Green & Co., 1933.

Part I of the present volume of researches on fungi, dealing with the structure and physiology of the mycelium in the higher fungi, may be regarded as a continuation of part II of volume IV. In the first part of chapter I the author discusses the formation of hyphal fusions (four types of which are recognized), and elucidates the development of clamp-connexions. The second part deals with the translocation of protoplasm through the septate mycelium of certain Pyrenomycetes, Discomycetes, and Hymenomycetes, the literature on which is summarized and a comprehensive account given of the writer's studies on the phenomenon in a number of fungi including *Fimetaria fimicola*, *Rhizopus nigricans*, and *Corticium solani*.

The existence of a central pore in each mycelial septum of an Ascomycete, a Basidiomycete, or a Fungus Imperfectus, as established by Wahrlich (*Scripta Bot. Hort. Univ. Imper. Petropol.*, iv, p. 101, 1893), whose work is recapitulated, has been verified by the author's observations, showing that the septa of fungi in general are formed by annular ingrowths from a lateral wall. In respect of protoplasmic continuity, therefore, the higher fungi resemble other plants in that all the living cells composing an individual are connected to form a single mass of protoplasm.

In *F. fimicola* the granular protoplasm of the mycelial cells was

observed to traverse the septa without impediment, and to pass through 'peg-to-peg' fusions (i.e., those taking place between the ends of two very short peg-like hyphae produced opposite to one another on the sides of two older hyphae). When protoplasmic streaming is relatively rapid, the vacuoles may be carried by the current for long distances; the maximum observed rate of protoplasmic flow in *F. fimicola* was estimated at 6 cm. per hour. In the compound mycelium of *Pyronema confluens* the protoplasm was seen to flow through 161 cells in succession and through three fusion passage-ways, thus affording ocular confirmation of the supposition (Researches on Fungi, iv, p. 182, 1931) that a function of hyphal fusions is to facilitate the transfer of food materials from one part to another of the mycelium. Experimental observations on pore plug formation in *F. fimicola* and *P. confluens* showed that the protoplasm of a cell injured by a needle always died throughout its length right up to its two septa, the pores of which became blocked by a plug.

Of special interest to phytopathologists is chapter II of part II (in collaboration with T. C. Vanterpool), which is concerned with the violent discharge of the basidiospores (the secondary conidia of authors) of *Tilletia tritici* [*T. caries*], the causal organism of wheat bunt [*R.A.M.*, xi, p. 289]. The discharge of the conidium with drop-excretion exactly resembles the corresponding processes in the Hymenomycetes and Uredineae, indicating that the falcate secondary conidia of the bunt organism are true basidiospores. Further evidence in support of this theory is furnished by a study of the comparative morphology of the basidial apparatus in the Tilletiaceae. A new terminology for *T. caries* is accordingly proposed, in which the whole product of a chlamydospore (basidium-body, primary and secondary sterigma, and primary basidiospore) will be known as a basidium, replacing Brefeld's concept of the latter as merely the promycelium and primary conidium or basidiospore. Secondary basidiospores are those produced on mycelial sterigmata. The primary basidiospores have two nuclei of opposite sex, and at this stage the fungus is homothallic. Into the secondary basidiospores, however, only one of the paired nuclei passes and the mycelium from them is haploid. At this stage the fungus appears to be heterothallic and the fusion between the two haploids of opposite sex probably occurs in the tissues of the host. In experiments with *T. caries* basidiospores were discharged horizontally to a distance of 1·2 to 1·4 mm. which is further than in any other known Basidiomycete. In the so-called 'spore-fall' method of inoculation, an agar slope with an active mycelial mat on its surface is inverted over wheat grains, which are thus exposed to the falling basidiospores shot away from their sterigmata. In contact with the primary leaf sheaths of the seedlings, the basidiospores readily germinate and produce mycelia. A considerable proportion of wheat plants inoculated by this method with *T. caries* and *T. levis* [*T. foetens*] yielded bunted heads, thereby proving that the secondary basidiospores in multiple inoculations are capable of causing bunt balls to form.

Chapters I and III of part II are devoted, respectively, to *Sporobolomyces*, a Basidiomycetous yeast-genus, and the *Sphaerobolus*

gun and its range. The volume concludes with a general summary of the outstanding results of the studies.

Rischkow (V. L.) & Karatschewsky (I. K.). **Chlorophyllmangel und Enzymwirkung. I. Katalasewirkung bei Panaschierung und Mosaikkrankheit.** [Chlorophyll deficiency and enzymatic action. I. Catalase action in variegation and mosaic disease.]—*Beitr. Biol. der Pflanzen*, xx, 3, pp. 199–220, 1 fig., 1933.

The results [which are tabulated and discussed] of investigations at Simferopol, Russia, on the catalase action in mosaic as compared with healthy potato and tomato leaves showed a reduction in the former in the proportion, on an average, of 1 : 2·7. The diseased material consisted of Wohltmann potatoes affected probably by the 'streak' form of mosaic [*R.A.M.*, xii, p. 716] and tomatoes (*a*) suffering from cucumber mosaic with fern-leaf and filiform leaves [ibid., xii, pp. 540, 731], and (*b*) artificially inoculated with potato mosaic. A corresponding, but in some cases much heavier, reduction was observed in the catalase action of variegated white and yellow foliage in a number of plants [which are listed].

Hatch (A. B.) & Hatch (C. T.). **Some Hymenomycetes forming mycorrhizae with Pinus strobus L.**—*Journ. Arnold Arboretum*, xiv, 3, pp. 324–334, 4 pl., 1933.

Full details are given of the authors' synthesis of mycorrhiza carried out partly at Melin's Laboratory in Stockholm and partly at Harvard University, following in general on the lines of Melin's work [*R.A.M.*, iv, p. 430]. Typical ectotrophic mycorrhiza were formed with *Pinus strobus* by the use of pure cultures of the following twelve fungi: *Lactarius chrysorheus* (Pennsylvania), *L. deliciosus* (Djursholm, Sweden) [ibid., xii, p. 386], *Amanita muscaria* (Djursholm), *Boletus castaneus* (Pennsylvania), *B. bovinus*, *B. luteus*, *B. granulatus* (all three from Djursholm), *Boletinus porosus* (Pennsylvania), *Mycelium radicis nigrostrigosum*, *M. r. abietis 1*, *M. r. strobi 1*, and *M. r. sylvestris 1* (all from Sweden). *M. r. atrovirens* overgrew the aerial parts of the seedlings and exhibited no indications of mycorrhizal formation. In some of the cultures *M. r. nigrostrigosum* and *M. r. abietis 1* were associated with the same seedling, each fungus forming typical mycorrhiza with short roots, while the former also produced a secondary mantle over several mycorrhiza of the latter type.

Günnewig (J.). **Beiträge zur Kenntnis und Bedeutung des Loliumpilzes.** [Contributions to the knowledge and importance of the *Lolium* fungus.]—*Beitr. Biol. der Pflanzen*, xx, 3, pp. 227–254, 1933.

A full account is given of the writer's studies at Lette, Westphalia, on the fungal infection of *Lolium* seed, represented by *L. temulentum*, *L. remotum*, *L. perenne*, and *L. multiflorum* from Germany and other countries [*R.A.M.*, x, p. 477]. The amounts of infection on *L. temulentum* (ranging from 0 in Palestine material to 98 per cent. in that from Liège, Belgium) are stated to approximate to the figures given by other workers, whereas *L. multi-*

florum (all German samples) was more extensively invaded (87 to 99 per cent.) than indicated in the literature. Only one sample of *L. perenne*, from Leningrad, out of a number tested showed infection and *L. remotum* (one sample) was free from fungus. A repetition of Fuchs's experiments (*Hedwigia*, li, p. 221, 1912) failed to disclose the presence of a *Fusarium* in the seeds.

In bouillon cultures of seed sterilized with calcium hypochlorite a mycelium appeared at the point of emergence of the seedling from the seed and this was transferred to a number of different media; on several of these [details of which are given] it fructified freely. The fungus proved to be a *Chaetomium* with perithecia 140 to 200 by 90 to 135 μ, asci 30 to 40 by 14 to 18 μ, and olive-brown ascospores 9·5 to 10·5 by 6 to 8 μ. It resembled *C. murorum* or *C. spirale*, but was identified at the Centraalbureau voor Schimmelcultures as *C. kunzeanum* Zopf. The same species was isolated from all the samples of *L. temulentum*, *L. multiflorum*, and *L. perenne* irrespective of their origin.

C. kunzeanum grew poorly on media lacking nitrogen and both infected and uninfected *Lolium* seeds were also found to require nitrogen for their development. It is considered improbable that *C. kunzeanum* binds free atmospheric nitrogen or assimilates free nitrogen in symbiosis with *L. temulentum*.

Inconclusive results were given by experiments in the inoculation of *Lolium* plants with the fungus. Infected *L. multiflorum* plants tiller less freely than healthy ones during the first year, but in contrast to uninfected individuals they form ears at this age, showing the presence of the fungus. In the second year tillering is normal and the ears are free from infection. The effects on *L. temulentum* were less conspicuous, consisting merely in a retardation of growth and a tendency to produce chlorosis.

Baldacci (E.). **Studi sulla fitoimmunità acquisita attiva.** [Studies on the active acquired immunity of plants.]—*Boll. R. Ist. Sup. Agr. di Pisa*, viii, pp. 457–472, 9 graphs, 1932. [Received October, 1933.]

After briefly summarizing the results of Jarach's experiments on the artificial immunization of beans [*Phaseolus vulgaris*] against *Botrytis cinerea* [*R.A.M.*, xi, p. 798] the author describes a test in which *Acrostalagmus cephalosporioides*, *Macrosporium commune*, *Aspergillus niger*, and *Botrytis cinerea* were grown in a synthetic nutrient solution and three kinds of 'vaccines' were obtained from them (prepared (*a*) by passing the culture liquid through a Chamberland filter, (*b*) from the filtrate after trituration of the mycelium with sand, and (*c*) from the residue of the ground mycelium and sand), in which seeds of Gentil rosso wheat, lucerne, and clover were germinated on sand or moistened cotton wool, fresh vaccine being added from time to time. Only the vaccines prepared by the first method retarded germination and reduced its percentage to any appreciable extent, this toxic effect being attributed to the presence of the metabolic waste products of the mycelium. The result agrees, on the whole, with that reached by De Paolis, working with metabolic products of a *Pythium* [ibid., xi, p. 164].

When seed of three wheat varieties was grown in the filtered

culture liquid from the first three fungi and only the one application of the vaccine was made, a very high percentage germination (71 to 100 per cent.) resulted, indicating that the previous toxicity of the vaccine was due to repeated application, and that when the dosage was reduced or diluted the toxicity was attenuated. The retarding effect on germination was, however, confirmed.

Twelve-day-old wheat seedlings germinated in water and transferred to the filtered vaccine obtained from *B. cinerea* made very poor growth as compared with the controls, the injury being in proportion to the concentration of the vaccine. One week after transference to fresh Knop's solution, however, all the seedlings except those grown in undiluted vaccine or in equal parts of vaccine and water resumed active growth. A fortnight later they were inoculated with a young culture of *B. cinerea*, and all developed symptoms of disease. The leaves rapidly turned yellow and died, the mycelium penetrating the tissues and being visible at the edges of the inoculation wound. Similar results were obtained with *A. cephalosporioides* and *M. commune*.

In the author's opinion, these results do not support Jarach's view that vaccinal immunity in plants is a vital, specific phenomenon.

Bunschoten (Gerharda E.). **Invloed van de voeding op de virulentie van schimmels.** [The influence of nutrition on the virulence of fungi.]—*Thesis, University of Utrecht* (Hollandia-Drukkerij, Baarn), 63 pp., 5 pl., 2 graphs, 1933.

A comprehensive and extensively tabulated account is given of the writer's investigations on the influence of nutrition on the virulence of *Sclerotinia sclerotiorum* and *Rhizoctonia* [*Corticium*] *solani*, tomato seedlings being used as the test plant for the former and *Brassica chinensis* for the latter.

The virulence of 8- to 21-day-old cultures of *S. sclerotiorum* was tested to determine the effect of various nitrogen compounds, two strains of the fungus being used, one from the Centraalbureau at Baarn isolated from lettuce in 1922, and the other supplied by W. H. Whetzel from *Phaseolus lunatus* in the United States in 1931. The two strains differed little in their response as regards virulence to growth on a number of standard media, and showed a high degree of virulence after culture on peptone-glucose-saccharose agar for 8 or 14 days. After 18 days' culture on this medium virulence was lost. In tests on synthetic media with different sources of nitrogen it was found that ammonium compounds produced the greatest virulence, followed by urea and asparagin. Among the carbohydrates (using ammonium sulphate as a source of nitrogen), saccharose, glucose, fructose, galactose, dextrin, maltose, and lactose conferred almost equal virulence on the cultures. Cellulose, soluble starch, and gum arabic led to loss of virulence. The accumulation of toxic metabolic products from the ammonium compounds, especially from peptone media, led to loss of virulence with age, the effect being visible from 14 days in culture onwards. These toxic effects of the ammonium compounds may be counteracted to some extent by the addition of sugar to the medium, enabling the fungus to resume the utilization of ammonium. After six months' growth on 4 or 40 per cent. saccharose agar, and then fresh sub-

culturing, the virulence of the cultures had declined to such an extent that they were useless for inoculation. A similar effect was observed after a year on malt salep, but on the other media the virulence of the fungus did not suffer from uniformity of nutriment for prolonged periods.

The strain of *C. solani* used in the writer's experiments was isolated by A. van Luijk from grass seed in 1931, and is identified, in accordance with K. S. Thomas's classification [*R.A.M.*, iv, p. 443] as *R. s. graminis*. The fungus made profuse growth on a number of natural and synthetic media and maintained its infective powers undiminished up to nearly three weeks in unchanged culture. It readily utilized different nitrogenous compounds, such as 0·5 per cent. ammonium sulphate, 0·5 per cent. ammonium chloride. and 0·4 per cent. ammonium nitrite, and was equally virulent with all those tested. Soluble starch was a very good source of carbon for maintaining virulence, as were also dextrin, gum arabic, saccharose, maltose, and glucose; lactose was found, however, to be definitely unsuitable for this purpose. At the age of three weeks the virulence of the cultures was generally declining, with the exception of those receiving soluble starch and ammonium sulphate as sources of carbon and nitrogen, respectively. Protracted uniformity of nutriment did not reduce the pathogenicity of *R. s. graminis* in cultures on potassium nitrate, ammonium chloride, ammonium sulphate, peptone, and asparagin as sources of nitrogen.

De Jager (H.). **Ziekteverschijnselen van enkele cultuurgewassen als gevolg van den inwerking van keukenzout.** [Pathological phenomena in some cultivated plants as a result of the action of cooking salt.]—*Thesis, University of Utrecht* (Hollandia-Drukkerij, Baarn), 95 pp., 12 pl., 2 figs., 1933. [English summary.]

A comprehensive and fully tabulated account is given of the writer's investigations on the pathological phenomena induced by the action of sodium chloride on wheat, rape seed, peas, and tobacco in water cultures.

A comparison of the effects of sodium nitrate, sodium sulphate, potassium chloride, and calcium chloride indicated that similar symptoms to those described for sodium chloride injury could be induced in the different plants by some or all of these salts.

Hall (Muriel P.). **An analysis of the factors controlling the growth form of certain fungi, with especial reference to Sclerotinia (Monilia) fructigena.**—*Ann. of Botany*, xlvii, 187, pp. 543–578, 2 pl., 6 graphs, 15 diags., 1933.

After a brief review of the work previously done in the study of the phenomenon of zonation or 'ringing' in various fungi, the author gives a detailed account of her controlled experiments with *Sclerotinia fructigena, S. laxa, S. fructicola,* and *Fusarium fructigenum*, the results of which showed that in these fungi zonation is mainly caused by alternations of light and darkness (the minimum length of exposure to light necessary to cause zoning varying with the specific fungus), and in *S. fructigena* and *F. fructigenum* also by alternations of high and low temperatures in darkness.

In *S. fructigena* zones were formed only in media of an acidity equal to or more acid than P_H 6.

DICKINSON (S.). **The nature of saltation in Fusarium and Helminthosporium.**—*Minnesota Agric. Exper. Stat. Tech. Bull.* 88, 42 pp., 6 figs., 1932. [Received September, 1933.]

Considerable details are given of experiments with *Helminthosporium pedicellatum*, *H. monoceras*, a species of the *H. brachysporium* type, *Fusarium fructigenum*, and *F. vasinfectum*, for the purpose of ascertaining some of the causes underlying the phenomenon of saltation in fungi. Preliminary studies showed that all the numerous nuclei present in the conidia of the species of *Helminthosporium* investigated originate from a single one, and that in the *Fusarium* species each cell in both the conidia and the mycelium contains only one nucleus. When cells or conidia, either containing one nucleus or arising from one nucleus, were isolated by the microscissors method [*R.A.M.*, xii, p. 579], they invariably produced colonies similar to those of the parent strains, and on further isolations, these strains were shown to give rise to saltant forms under appropriate conditions. This fact is considered to indicate that in the species studied saltation is not due to heterocaryosis.

During the course of the work, attempted or perfect hyphal fusions were observed between almost all of the strains used, and details are given of the procedure adopted to obtain such fusions. The study, in particular, of the fusion cells formed between pairs of cells of two contrasting strains of *F. fructigenum* (one of which had arisen by saltation from the other), in the process of whose formation the cytoplasms of the two parent strains are assumed to have thoroughly mixed with each other, showed that on isolation such fusion cells gave rise to growths in which the cultural characters of one or other of the two parent strains were found unchanged, no intermediate or new forms being produced, an observation which suggests that the difference between the latter is not of a cytoplasmic nature. Taken in conjunction with the disproval of heterocaryosis, this fact tends to show that in *F. fructigenum* saltation was caused by a change in the nucleus, and was therefore a mutation, but whether due to a chromosomal aberration or a gene change cannot yet be determined.

DAS GUPTA (S. N.). **Formation of pycnidia in Cytosporina ludibunda by the intermingling of two infertile strains.**—*Ann. of Botany*, xlvii, 187, pp. 689–690, 1933.

In this brief note the author states that two saltant strains (CA_2 and CA_4) of *Cytosporina ludibunda* [*R.A.M.*, xii, p. 573], which are infertile when kept separately, have been now found to produce pycnidia in mixed cultures of the two, but attempts to determine whether or not hyphae of the two strains fuse together before the formation of the pycnidia have so far proved unsuccessful.

ALLEN (RUTH F.). **A cytological study of the teliospores, promycelia, and sporidia in Puccinia malvacearum.**—*Phytopath.*, xxiii, 7, pp. 572–586, 4 figs., 1933.

In *Puccinia malvacearum*, the well-known rust of hollyhocks

and other Malvaceae [*R.A.M.*, x, p. 259], teleutospores are formed by binucleate basal cells, each of which by branching may give rise to several spores in succession. Each spore initial divides into spore and stalk cell, the former of which again divides to produce the bicellular spore. Fusion occurs between the two nuclei in each cell of the spore, between the two large nucleoli in the fusion nucleus, and possibly the chromatin strands become paired. After migration into the young promycelium the nuclear membrane disappears and the chromosomes (probably numbering five) lie scattered in the cytoplasm. The spindle forms and the nucleus divides with the passage of the (apparently 5) daughter chromosomes to each pole. The promycelium is divided by a cell wall into two cells, and a second nuclear and cell division promptly follows. Each cell extrudes a broad beak at its upper end, which swells at its tip to form the sporidium. The nucleus passes out into the young sporidium and divides, the later stages of the division succeeding the discharge of the sporidium. Mature sporidia are regularly binucleate.

VOLKART (A.). **Abbau und Viruskrankheiten.** [Degeneration and virus diseases.]—Reprinted from *Landw. Vorträge*, 55 pp., 1933.

This is a discussion of the current theories concerning the nature of potato degeneration (with special reference to H. Morstatt's ecological hypothesis, followed up and amplified by F. Merkenschlager *et al.*) [*R.A.M.*, iv, p. 426; xi, p. 395 *et passim*], and its connexion with virus diseases, the most recent investigations on which are concisely summarized under the headings of filterability, size, nature of the agents, characteristic properties, relations with the host, and insect transmission. The author is satisfied that potato degeneration as observed in Switzerland is entirely to be attributed to the influence of virus diseases.

COCCHI (F.). **Ricerche sulla 'scabbia' delle Patate.** [Researches on Potato scab.]—*Boll. R. Staz. Pat. Veg.*, N.S., xiii, 1, pp. 74–139, 2 figs., 1933. [English summary.]

The author gives a very full account of the morphology and physiology of three strains of *Actinomyces* isolated from common scab of potatoes or from the earth adhering to the scabs, one of which was identified as *A. flavus*, another as *A. clavifer*, while the third (referred to as Aa) could not be identified as belonging to any of Millard's and Burr's species [*R.A.M.*, vi, p. 179; xi, p. 200].

On the same media each strain retained its cultural characters even after a long series of transfers, the colonies losing, however, their reproductive power after four months. All three organisms grew at a range of hydrogen-ion concentrations from P_H 5 or 5·6 to about 9, with an optimum of 7 to 7·5, and at a temperature range of 10° to 40° C., with an optimum of about 25° to 30°. The best source of nitrogen was nitrates and the best carbohydrate was glucose. They produced different amounts of proteolytic enzymes, sucrase, maltase, lactase, amylase, and cellulase; they did not produce tyrosinase or lipase, acids or bases, and did not attack

cork, or penetrate the cut surfaces of potato tubers once suberization had been completed.

The paper concludes with a brief account of recent researches into the host-parasite relationship in potato scab, varietal resistance, the effect of environmental factors on infection, and control. A bibliography of 89 titles is appended.

REDDICK (D.). **A Potato disease.**—*Phytopath.*, xxiii, 7, pp. 622–624, 1 fig., 1933.

A brief description is given of a virus-like disease of potatoes at Ithaca, New York, which was found to be due to infestation by a mite of the genus *Tarsonemus* and which corresponded, except for minor variations, with one described by Carpenter in Hawaii in 1918 and by Mann and others in India (where it is known as 'tambera' disease) in 1920. The mites are microscopic in size and scarcely seem abundant enough on the foliage to account directly for the profound changes induced in the plants.

GIGANTE (R.). **Nota preliminare sulla 'necrosi del cuore' dei tuberi di Patata.** [A preliminary note on heart necrosis of Potato tubers.]—*Boll. R. Staz. Pat. Veg.*, N.S., xiii, 1, pp. 155–159, 1 fig., 1933. [English summary.]

When potato plants were grown in Italy from tubers of the Böhms Allerfrüheste Gelbe variety affected with the non-parasitic heart necrosis recently reported from Germany, as characterized by an internal brown spot sometimes developing into a large cavity [*R.A.M.*, xi, p. 534], they remained sickly and stunted, and produced only a few small tubers of which 14 to 58 per cent. were affected by heart necrosis. It is therefore concluded that the condition is hereditary.

HEMMI (T.). **Experimental studies on the relation of environmental factors to the occurrence and severity of blast disease in Rice plants.**—*Phytopath. Zeitschr.*, vi, 3, pp. 305–324, 8 figs., 1933.

The writer here summarizes in English the results of investigations conducted in Japan by himself and his students on the blast disease of rice (*Piricularia oryzae*) [*R.A.M.*, xii, p. 532], most of which have already been noticed in this *Review*. It is considered that the known influence of low soil temperatures in increasing the disease is due to the reaction of the host plant, not the parasite, the highest degree of resistance being shown at temperatures (about 28° C.) most favourable to the growth of rice, while at 20° C. the normal metabolism of the host is impeded and susceptibility increases. Attention is drawn to a point on which further studies (with H. Suzuki) are in progress, namely, the connexion between resistance to blast and the capacity for absorption of silicates from moist soils.

MURRAY (R. K. S.). **A note on sun-scorch of budgrafts.**—*Trop. Agriculturist*, lxxx, 6, pp. 349–351, 1933.

The author states that in March, 1933, cracking due to sun-scorch of the bark on the raised portion of the 'elephant foot' of

bud grafts of *Hevea* rubber [*R.A.M.*, xii, p. 591] again occurred at the Experiment Station, Nivitigalakele, Ceylon. In several instances the lesion thus formed was invaded by *Botryodiplodia theobromae*, which extended the damage several inches up the scion and into the wood. The condition may be prevented by the avoidance of exposure to the direct rays of the sun.

SANFORD (G. B.). **Some soil microbiological aspects of plant pathology.**—*Scient. Agric.*, xiii, 10, pp. 638–641, 1933. [French summary.]

The author discusses briefly the variations following different cultural practices (e.g., crop rotation and fallowing) in the virulence of, and intensity of attack by, certain soil-inhabiting pathogenic micro-organisms on the underground parts of plants. In pointing out the importance of this problem in the study of control measures against certain soil-borne diseases of cultivated crops, such as the various foot rots of cereals, common scab (*Actinomyces scabies*) and *Rhizoctonia* [*Corticium solani*] stem canker of potatoes, and the like, he stresses the necessity of determining whether the reduction in the intensity of attack brought about by a given cultural method is due to an actual decline in the numerical strength of the pathogens caused by resulting uncongenial environmental conditions, or to modifications in the virulence of the parasites caused by the action on them of other antagonistic micro-organisms, the development of which is favoured by these conditions [cf. *R.A.M.*, xii, p. 684].

DEMETER (K. J.) & MOSSEL (H.). **Über die Brauchbarkeit von Cholodnys mikroskopischer 'Aufwuchsplattenmethode' bei mikrobiologischen Boden-Untersuchungen.** [On the applicability of Cholodny's microscopic 'slide growth method' to microbiological soil investigations.]—*Zentralbl. für Bakt.*, Ab. 2, lxxxviii, 17–22, pp. 384–393, 2 pl., 1933.

The results of manuring experiments on potatoes and beets at Weihenstephan, Bavaria, indicated that Cholodny's microscopic 'slide growth method' [*R.A.M.*, xii, p. 324] is better adapted than any other process for the observation of certain qualitative and quantitative changes in the soil microflora. The advantages and drawbacks of the method are discussed and some suggestions made for its improvement.

BEARD (F. H.). **Symptoms of manurial deficiencies in Hops.**—*Ann. Rept. East Malling Res. Stat. 1st Jan. 1932 to 31st Dec. 1932*, pp. 156–158, 1 pl., 1933.

Brief descriptions are given of the foliage characters shown by hop plants grown for three seasons in pots containing pure sand and fed with the following nutrient solutions, viz., (1) complete nutrient solution, (2) nitrogen omitted, (3) potassium omitted, (4) phosphorus omitted, (5) calcium omitted, (6) magnesium omitted, (7) rain water only [cf. *R.A.M.*, ix, p. 415]. The symptoms (which were also marked in field tests) allow of the ready identification of the various nutritional deficiencies.

SUMMERS (E. M.). **Mosaic disease in Co. 281 Cane.**—*Sugar Bull.*, xi, 23, pp. 3–4, 1933. [Abs. in *Facts about Sugar*, xxviii, 10, p. 398, 1933.]

The Co. 281 sugar-cane variety, hitherto regarded as specially valuable under Louisiana conditions, is stated to be contracting mosaic in a serious form [cf. *R.A.M.*, xi, p. 604], necessitating careful seed selection. The risks of a spread of infection by this variety are considered to be graver than in the case of the P.O.J. canes. It is recommended that Co. 281 be grown in special plots, from which the affected stools are periodically rogued by an expert.

FAWCETT (G. L.). **Las rayas blancas de las hojas de la Caña de Azúcar.** [The white stripes of Sugar-Cane leaves.]—*Rev. Indust. y Agric. de Tucumán*, xxii, 11–12, pp. 299–302, 1 fig., 1932. [Received October, 1933.]

In the spring of 1931 sugar-cane leaves in Tucumán, Argentine Republic, developed white stripes, 1 to 8 mm. in width, sometimes extending the whole length of the leaf and almost covering it. The only leaves exempt from the striping were the two smallest near the base of the plant. Some shoots of affected plants were completely white and generally died on reaching a height of 20 to 30 cm. It was thought that the phenomenon might be due to the action of low temperatures [cold chlorosis: *R.A.M.*, vii, p. 808; xii, p. 329], but the experimental exposure of cane shoots to a range of 4° to 8° C. for periods of four to six hours failed to produce the effects observed in the field. It is concluded that the condition (which caused little damage and did not recur in 1932–3) represents a genetic mutation of unknown origin involving the embryonal cells near the growing point.

FAWCETT (G. L.). **Notas sobre las enfermedades de la Caña de Azúcar.** [Notes on Sugar-Cane diseases.]—*Rev. Indust. y Agric. de Tucumán*, xxiii, 3–4, pp. 68–69, 1933.

The sugar-cane varieties most widely cultivated in Tucumán, viz., P.O.J. 36 and 213, are stated to be completely infested by mosaic [*R.A.M.*, xii, p. 594]. Satisfactory results have been obtained at the Experiment Station with the recently introduced immune varieties P.O.J. 2878 and 2725 as well as with some from Coimbatore, India. Notes are also given on cold chlorosis and on the newly observed white striping of obscure origin [see preceding abstract].

MUNGOMERY (R. W.) & BELL (A. F.). **Fiji disease of Sugar Cane and its transmission.**—*Queensland Bureau of Sugar Experiment Station, Div. of Path. Bull.* 4, 28 pp., 8 figs., 1933.

After a brief historical review of the Fiji disease of the sugar-cane, in which the trouble is stated to have been first observed in Fiji, but is believed to have originated in New Guinea or adjacent islands, and to have been since reported, in addition, from the Philippine Islands, Australia, and Java (where it was found only in the quarantine garden), the authors give a description of the symptoms caused by it, with particular reference to the intracellular inclusions or X-bodies which are present in the cells of the

abnormal tissue [*R.A.M.*, iii, p. 606]. In a discussion of the control measures in general use in Australia, it is stated that none of the chief sugar-cane varieties so far tested by the authors has exhibited high resistance to Fiji disease, and a list is given, as arranged by North, of 19 varieties ranging from moderately resistant to susceptible. In trial plots in Fiji and New South Wales the later P.O.J. canes of the Kassoer 'blood line' [ibid., viii, p. 404; xi, p. 266], the introduction of which into Queensland was contemplated because of their high resistance to the gumming disease [*Bacterium vascularum*], have given indications of being much more susceptible to the Fiji disease than any of the varieties now commercially grown in Queensland [see next abstract].

All attempts to transmit the disease by mechanical methods, including Bonazzi's diseased plug method [ibid., vi, p. 184], gave negative results, but controlled experiments with the insects *Perkinsiella saccharicida*, *Aphis sacchari*, and *Trionymus sacchari* [ibid., xi, p. 327] in insect-proof cages and in trial plots showed that the disease is readily transmitted by the nymphs of *P. saccharicida* which have been bred upon Fiji diseased canes. The incubation period appears to be rather long, approaching two months. It has not yet been established whether the adult insects developed from infective nymphs are also capable of transmitting the disease to healthy canes, as the experiments with adults have hitherto failed. In no case was the disease transmitted by *A. sacchari* or *T. sacchari*.

Systematic field observations have shown that the visible spread of Fiji disease under natural conditions in Queensland is greatest in the hotter and wetter months of the year, and is most rapid where conditions are most favourable for the growth of the sugar-cane. A direct correlation has been found between the rate of spread of the disease and the numerical strength of the *P. saccharicida* population.

The Java Wonder Cane. A warning to Cane-growers.—*Queensland Agric. Journ.*, xxxix, 6, pp. 259–260, 1933.

Tests recently carried out in Queensland showed that under local conditions the P.O.J. 2878 sugar-cane is extremely susceptible to downy mildew [*Sclerospora sacchari*: *R.A.M.*, x, p. 339], almost all the propagation plots of this variety laid down in areas where the disease is prevalent having been condemned. In the extreme north of Queensland, where, under favourable climatic conditions, top rot [loc. cit.] appears, this cane is certain to suffer heavily, as it is highly susceptible to this disease also. In those parts of the Fiji Islands where Fiji disease [see preceding abstract] occurs, the P.O.J. 2878 canes have also been exterminated [cf. ibid., x, p. 622; xi, p. 541]. To pokkah boeng [*Gibberella moniliformis*] the variety is as susceptible as its sister cane P.O.J. 2714 [ibid., viii, p. 338; xii, p. 328], and although this disease is at present only of minor importance in Queensland, it might become serious were susceptible canes to be extensively grown. P.O.J. 2878 is, however, very useful in the presence of mosaic and gumming [*Bacterium vascularum*: ibid., xi, p. 327], being more resistant to the latter than any other cane variety in Queensland.

Sección de Botánica y Fitopatologia. [Botanical and Phytopathological Section.]—*Informe Anual Estac. Exper. Insul. Dept. Agric. y Com. Puerto Rico 1931–32*, pp. 36–37, 1933.

A severe outbreak of gummosis [*Bacterium vascularum*: see preceding and next abstracts] occurred in the sugar-cane plantations of Vieques, while slighter attacks were reported on the Cristalina, Rayada, and H. 109 varieties in the Rio Piedras district of Porto Rico. 'Fourth disease' [*R.A.M.*, xii, p. 593], mottled stripe, leaf stipple, and Pahala blight [ibid., xi, p. 328] have been definitely identified on sugar-cane in Porto Rico; these disturbances have been under observation for seven, four, nine, and nine years, respectively. False scald [ibid., xii, p. 593] is of very rare occurrence on the Island.

Wiles (D. R. D.). **Section VI. Administrative and experimental work. Control of pests and diseases.**—*Barbados Agric. Journ.*, ii, 1–2, pp. 11–15, 1933.

Notes are given by the Plant Diseases Inspector on the present position in regard to mosaic of sugar-cane in Barbados and the measures for its control. Symptoms of gumming disease [*Bacterium vascularum*: *R.A.M.*, x, p. 127 and preceding abstracts] were observed in January, 1933, in a young crop of the Ba. 11569 variety planted in the previous November. So far, however, no complaints have been received from factories concerning difficulty in the manufacture of sugar from affected canes.

Tehon (L. R.). **Notes on the parasitic fungi of Illinois.**—*Mycologia*, xxv, 4, pp. 237–257, 1 pl., 1933.

Continuing his series of notes on the parasitic fungi of Illinois [*R.A.M.*, ix, p. 62], the writer describes 23 species (20 new with four new genera, provided with Latin and English diagnoses), the following being of phytopathological interest. *Microthyriella rubi* [ibid., xi, p. 61] from *Rubus argutus* apparently represents the ascigerous stage of *Leptothyrium pomi* [ibid., xi, p. 657]. *Aristastoma concentrica* n. g., n. sp. produced alternate red and white, concentrically zonate lesions on cowpea leaves. The spherical to applanate pycnidia, 180 to 270 μ in diameter, with a circular ostiole, 25 to 35 μ in diameter, occur exclusively in the white zones and are crowned by a ring of dark-coloured, blunt, straight, septate setae, 20 to 65 by 6·5 to 10 μ; the oblong, 1- to 4-, mostly 3-septate pycnospores measure 15 to 35 by 4·5 to 6 μ. *Cribropeltis citrullina* n. g., n. sp., an agent of 'fly speck' on watermelon fruits, may be recognized by its brown, septate, straight, profusely branched mycelium with hyphae 3 to 4 μ in diameter; black, irregularly circular pycnidia, 300 to 600 μ in diameter; simple, hyaline, clavate conidiophores, 5 to 6 by 2 to 3 μ; and simple, hyaline, oblong, straight or slightly curved conidia, 10 to 15 by 4 to 5 μ.

Unamuno (L. M.). **Enumeración y distribución geográfica de los Esferopsidales conocidos de la Península Ibérica y de las Islas Baleares, Familia Esferioidáceos.** [Enumeration and geographical distribution of the Sphaeropsidales recognized in

the Iberian Peninsula and Balearic Islands, family of Sphaerioidaceae.]—*Mem. Acad. Ciencias Madrid, Ser. Ciencias Nat.*, iv, 458 pp., 1933.

An annotated list is given of 1,695 species of Sphaeropsidales (family Sphaerioidaceae) hitherto recognized in the Iberian Peninsula and Balearic Islands, alphabetical indices of the species and hosts and a ten-page bibliography being appended.

KLEBAHN (H.). **Ueber Bau und Konidienbildung bei einigen stromatischen Sphaeropsideen.** [On the structure and conidial formation of some stromatic Sphaeropsideae.]—*Phytopath. Zeitschr.*, vi, 3, pp. 229–304, 106 figs., 1933.

In 1922 a consignment of young Douglas firs (*Pseudotsuga douglasii*) [*P. taxifolia*] was returned to the large forest nursery at Holstenbek, Holstein, from which they were procured, in consequence of their diseased condition.

On examination of this material the writer found a number of fungi, but the inoculations that he was able to carry out with these gave negative results. Detailed morphological studies on cultures of several *Phoma*-like species found on the diseased material led to the formation of a new genus, *Allantophoma*, for three, while a fourth is considered to be a *Phomopsis*, *P. microspora* n. sp. *A. endogenospora* n. g., n. sp. is characterized by spherical to irregular pycnidia, nearly always with projecting corners or angles, the spherical 250 to 300 μ in diameter and the irregular 250 to 330 μ in height by 350 to 400 μ in width, and by elongated-cylindrical, allantoid, continuous conidia measuring 7 to 10 by 2 to 2·5 μ arising directly from the cells of the whole of the inner wall lining an irregular cavity formed by the dissolution of an originally solid stroma, the outer cells of which are distinctly plectenchymatous, except in the upper part where they are pseudoparenchymatous. The conidia are formed endogenously in the cells lining the cavity and are set free by the dissolution of the cell wall. In *A. exogenospora*, on the other hand, the conidia are borne on well-marked conidiophores; in size and structure the fruit bodies of this species resemble those of the preceding. *A. nematospora* is characterized by irregularly spherical or ellipsoid pycnidia, 250 to 340 μ in height by 300 to 350 μ in width (sometimes only 270 by 200 μ). Unlike the two foregoing species, this is furnished with a broadly conical papilla which may be up to 120 μ in height and 210 μ in width, but is usually 50 to 80 by 90 to 120 μ. The size and shape of the conidia agree almost exactly with those of two previous species, but in *A. nematospora* a filiform appendage, about equal in length to the conidium, is present. The mode of origin of the conidia in this species is very complex, two quite distinct structures apparently giving rise to these spores, viz., columnar, conical, or irregular cell groups projecting from the cavity wall, mostly separated by lacunae but occasionally united to form a loose tissue; and flat protuberances composed of short, palisade-like or actinomorphic cell layers. The connexion, if any, between these two types of structure and their relation to the process of conidial formation have not yet been clearly traced and

it is not certain whether the conidia are formed endogenously or exogenously or both.

P. microspora is characterized by spherical, ellipsoid or irregular pycnidia, 150 to 340 μ in height by 180 to 400 μ in width, with a papilla 60 to 80 μ in height by 80 to 110 μ in width, and conidia measuring 5·5 to 6 by 2·5 to 3 μ, tapering at both ends. The conidia are formed on distinct conidiophores from the inner cell layer of the pycnidial wall, the rest of which is, as in the other fungi described above, mainly plectenchymatous.

Notes are given on the microscopic structure of *Phomopsis abietina* [*R.A.M.*, x, p. 278] and *Sclerophoma pityophila* [cf. ibid., ix, p. 281] on pine (*Pinus sylvestris*) needles, and it is stated that in the latter the conidia are developed endogenously. Other fungi characterized by this or other atypical modes of conidial formation are *S. taxodii* Roum. on *Taxodium* (endogenous), *S. strobi* on *P. strobus* (endogenous and also formed by budding from the protoplasts of the cells after the cell wall has partly dissolved), *S. magnusiana* (*P. pitya* Sacc.) in which the process resembles the last, *Blastophoma thuemeniana* n. g., n. sp. (*Sphaeropsis pitya* v. Thümen) on larch branches (conidia formed by budding from isolated cells set free into the cavity of the pycnidium), *B.* (?) *douglasii* n. sp. (*Phoma douglasii* Oudemans) on cones of *Pseudotsuga taxifolia*, *Stictophoma acicola* n. g., n. sp. (*Sphaeronema acicola* Lév.) on pine (*P. sylvestris*) needles (conidia arising endogenously from files of cells in the interior of the pycnidium), *Schizophoma* (?) *pini* n. g. (*Sphaeronema pityophilum* Corda) on pine needles (conidia endogenous in rows or groups of cells), *Tylophoma sorbi* n. g., n. sp. (*Dothiora sorbi*) on *Sorbus aucuparia* (endogenous), *Chondroplea populea* n. g., n. sp. (*Dothichiza populea*) on *Populus nigra* [ibid., xi, p. 338] (differing from the type species of the genus *Dothichiza* in having conidia in rows projecting into the pycnidial cavity and apparently developed endogenously in a wide conidiophore arising from the cells of the innermost layer), and *Corethrostroma laricis* n. g., n. sp. (*P. pityella*) on *Larix leptolepis* (with conidia formed in long crowded rows from the longitudinal division of successive layers of elongated cells lining the pycnidial cavity).

All these fungi and several other allied forms are critically examined and the reasons for their reclassification discussed at length. *Dothiorella populea* and *Cytosporella populi* are regarded as synonyms of *Chondroplea populea*.

Shear (C. L.). **Life histories of Tryblidiella species.**—*Mycologia*, xxv, 4, pp. 274–285, 5 figs., 1933.

Pure cultures from single ascospores of *Tryblidiella leprieuri* on dead tea branches supplied by A. C. Tunstall from India give rise to macropycnidia resembling those of *Diplodia natalensis* [cf. *R.A.M.*, x, p. 345] though without the longitudinal striae characteristic of the pycnospores of the latter. Similar cultures of *T. rufula* from *Rhus* in Florida yield micropycnidia with hyaline, subglobose spores, and *Diplodia*-like macropycnidia containing broadly striate pycnospores agreeing with those of *D.* [*Botryodiplodia*] *theobromae* in everything but size, while a species closely

resembling the foregoing from black cherry (*Prunus serotina*) produced macro- and micropycnidia of the same type but distinct from the preceding and in the macrospore form scarcely distinguishable from *D. mori*. Cultures of single ascospores of a *T. rufula*-like form from *Melia* in Alabama give rise to macro- and micropycnidia agreeing with those on *P. serotina*, while those of *T. hysterina* from *Ilex vomitoria* in North Carolina and Alabama produce micropycnidia and macropycnidia resembling those of *D. alni*.

The *Diplodia*-like forms thus obtained show a general similarity to those arising from ascospore cultures of *Physalospora*, thereby indicating the difficulty of separating genera of the Ascomycetes by means of their imperfect stages.

GHIMPU (V.). **Afecțiunile patologice și inamicii Tutunului din România în 1932.** [Pathological troubles and pests of Tobacco in Rumania during 1932.]—Reprinted from *Bul. Cultivărei și Fermentărei Tutunului*, Bucarest, xxi, 4, 9 pp., 1932. [French summary. Received September, 1933.]

This is a brief annotated list of the more important parasitic diseases and insects which were observed on tobacco in Rumania during 1932. Besides the four virus diseases previously recorded by the author [*R.A.M.*, xii, p. 580], recent observations have shown the occurrence in the country also of tobacco crinkle as known in America. Kroepoek [leaf curl: ibid., xii, p. 474], and Wisconsin leaf spot (*Bacterium melleum*) [ibid., x, p. 77] are stated to have been found recently on the grounds of the Experiment Station for the Cultivation and Fermentation of Tobacco near Bucarest, and the latter proved to be widespread in most of the Rumanian provinces. Fungal diseases are stated to have caused but little damage to the crop in the year under review.

MOORE (E[NID] S.). **Important to Tobacco growers. The crinkly dwarf menace of Tobacco.**—*Farming in South Africa*, viii, 88, p. 276, 1 fig., 1933. [Afrikaans translation.]

This is a popular note on the symptoms, etiology, and control of crinkly dwarf [leaf curl] of tobacco [see preceding abstract]. Practically unknown in Africa a few years ago, this disease is stated to constitute a serious menace to the crop in East Africa, Rhodesia, and the Transvaal. In the last-named it is not uncommon to see half the plants in a field more or less severely affected, while in some cases the entire crop is rendered worthless by leaf curl, which has even been observed in the seed-beds. Emphasis is laid on the necessity of cleaning up old tobacco lands during the winter in order to deprive the insect vectors (whiteflies) [Aleyrodidae] of infected material on which to feed. By this means the perpetuation of the disease may be largely prevented.

GRAINGER (J.). **The movement of Tobacco mosaic virus in its host.**—*Ann. of Appl. Biol*, xx, 2, pp. 236–257, 1 fig., 4 graphs, 1933.

The experiments described in detail in this paper were carried

out from 1928 to 1930, chiefly in a greenhouse at a temperature of about 75° F. in Leeds, and partly in a greenhouse at 90° at Madison, Wisconsin, for the purpose of determining the movement and distribution of the tobacco mosaic virus chiefly in the Connecticut Havanna No. 132 variety of tobacco. Uniform batches of five plants were inoculated by needle scratches either at the tip of a leaf, the area of inoculation being sharply delimited by a scratch of the needle at right angles to the midrib, or in a determined region of the stem, from which the subtended large leaves were removed. The tests for the spread of the virus down the leaves were made by severing the inoculated leaves at pre-determined distances below the limit of inoculation after the lapse of a certain time, the distance being greater the longer the period between inoculation and cut, the subsequent development of symptoms in the plants indicating whether the virus had spread into the parts proximal to the cut or not. The study of the spread of the virus up the leaf or stem involved the inoculation of other batches of plants with the juice obtained from a series of transverse strips 1 cm. wide, aseptically cut off at appropriate distances from the inoculation point. The general results of the tests indicated that the virus spreads in the plant at first slowly, but later on more rapidly, and the graphs show a logarithmic relation between the distance travelled and the time taken. The fact that in a typical case, while the inoculated controls showed the first symptoms of mosaic after eight days, the plants whose leaves were cut at a distance of 5 cm. from the inoculation limit after five or seven days displayed the first symptoms 12 days after inoculation, is considered to suggest that the cutting of the leaves removes all but a very small amount of virus, which has then again to begin the process of multiplication and spreading. There was some evidence that the rate of spread of the virus is increased by a rise in temperature.

Experiments to determine the rate of increase in concentration of the virus in the tissues of the host near the point of inoculation indicated that it may be represented by a sigmoid curve of the kind typical of the growth of living organisms and of the rate of accumulation of the catalyst in an autocatalytic reaction. It was also shown that in plants inoculated at the base of the stem the virus travels first to the growing point and the young leaves, where it multiplies and spreads progressively to the older leaves in the inverse order of their formation. When the growing point was removed immediately after inoculation, the appearance of the virus in the young leaves was delayed by about three days. Another set of tests indicated that the virus is capable of moving upwards and downwards across a portion of the stem killed by steaming [cf. ibid., x, p. 66; xii, p. 598], and similarly up and down the leaf lamina across a barrier of steamed tissue. The view that the spread of the virus can take place in the parenchyma is supported by the results of several experiments and the fact that spread was obtained in detached tobacco stems and leaves, the latter of which were kept with their petioles immersed in moist sand after being inoculated at the tip, but the results of tests to determine the ultimate distribution of the virus in mature tobacco

plants which had been inoculated in the seedling stage, showed a surprisingly high concentration of the virus in the xylem.

It was determined by dilution tests that the virus is present in the light green areas of a tobacco leaf at a concentration ten times greater than in the dark green areas.

Naturally produced guttation water from tomato plants infected with the tobacco mosaic does not carry the virus, but guttation water obtained by the application of high pressures to the cut petiole ends was infective from the very start and gave 100 per cent. infection when inoculated into healthy tobacco plants, the suggestion being that the pressure was sufficient to rupture the leaf cells and leach out the virus.

ROQUE (A.). **Bacterial wilt of Tobacco in Puerto Rico and its intertransmission to other Solanaceous hosts.**—*Journ. Dept. Agric. Puerto Rico*, xvii, 2, pp. 145–156, 3 pl., 1933.

The author describes an outbreak in 1931 of bacterial wilt [*Bacterium solanacearum*] in a field of two of the Porto Rican standard varieties of tobacco (Ceniza and Utuado), this being apparently the first case reported on tobacco in Porto Rico, where the disease is prevalent on several other solanaceous crops [*R.A.M.*, xi, p. 29]. Cultural studies and pathogenicity tests of the tobacco organism conclusively established its identity with *Bact. solanacearum* as described by E. F. Smith, and showed that it is readily transmissible from diseased tobacco plants to other solanaceous plants, and from these back to tobacco. Under Porto Rico conditions *Bact. solanacearum* seldom, if ever, attacks tobacco through the aerial parts, infection usually taking place through the underground organs, since in the numerous wilted plants examined the advance of infection could always be traced from the roots upwards. Aerial infections of peppers [*Capsicum annuum*], however, gave positive results.

The fact that the outbreak occurred in a field that had been previously under sugar-cane for many years is considered to indicate that crop rotation is not a reliable measure for the control of the disease, and this is further supported by the fact that the sowing of four varieties of tomatoes in a field which had not borne any solanaceous crop for at least 15 years proved a complete failure from bacterial wilt. Control through the use of resistant varieties appears to be much more promising, since the tobacco varieties tested have shown a wide range of varying susceptibility, most of the local varieties being highly resistant. The Red Bliss Triumph potato is also very resistant. It is only among tomatoes that no resistant variety has so far been found.

WOLF (F. T.). **The pathology of Tobacco black shank.**—*Phytopath.*, xxiii, 7, pp. 605–612, 1 fig., 1933.

The writer's studies at Duke University, Durham, North Carolina, have shown that the rapid wilting and collapse of tobacco plants attacked by *Phytophthora* [*parasitica*] *nicotianae* [*R.A.M.*, xii, p. 471] are due to a toxin, which may be extracted from black shank lesions and is also present in potato broth and Richards's culture solution used for the growth of the fungus. The toxin is

thermostable within a range of 34° to 212° F., non-volatile, and probably partakes of the nature of a protein, being precipitated by crystals of magnesium sulphate added to the filtrate from macerated diseased tissues in distilled water. The black shank fungus produces acids (other than oxalic) during the decomposition of the tissues and in culture media, but evidence was obtained that these substances are not responsible for the wilting of the plants. It also produces enzymes (amylase, zymase, maltase, and invertase) enabling it to utilize the middle lamella, secondary membranes, starch, sucrose, dextrose, and maltose in the host.

HOPKINS (J. C. F.). **Mycological notes. Seasonal notes on Tobacco diseases. 6. An unusual type of frog eye spotting.** —*Rhodesia Agric. Journ.*, xxx, 6, pp. 472–474, 1 pl., 1933.

A brief account is given of a tobacco leaf spot which was observed in a district of Rhodesia in 1933, and which, while exhibiting symptoms almost typical of the brown spot caused by *Alternaria longipes* [*R.A.M.*, xi, p. 207 and above, p. 748], was found to be caused by the frog eye spot fungus (*Cercospora nicotianae*) [ibid., xii, p. 476]. The abnormal aspect of the lesions is ascribed to a prolonged cold and wet period at the beginning of the year, followed by a severe drought later in the season. It was noticed that these spots were most prevalent on the chlorotic lower leaves both during the cold and wet period and during the drought. The fungus isolated from these spots produced spores and conidiophores somewhat differing in their dimensions from the usual type.

WARDLAW (C. W.) & MCGUIRE (L. P.). **Tomato storage. Further observations on the storage of tropically grown Tomatoes.** —*Trop. Agriculture*, x, 6, pp. 161–163, 1933.

The primary object of the work briefly reported in this paper was to establish the effect of different manurial treatment during growth on the keeping qualities of tomato fruits in cold storage. While in early season tests no positive results could be obtained, owing to exceptionally unfavourable weather conditions, which promoted infection of the green fruit by fungi and led to the development of fungal rots during storage, the results of a series of tests carried out later on, when conditions had become drier, showed that tomato fruits grown in the tropics, if they escape infection with fungi, are possessed of good keeping quality in cold storage (17 days at 45·5° F.). During the course of these trials it was observed that out of a total of 254 fungal infections that were investigated, 205 were caused by *Phoma destructiva* [*R.A.M.*, xii, p. 121], and 30 by various species of *Fusarium*.

DODGE (B. O.). **The Dutch Elm-disease in a neighboring State.** —*Journ. New York Bot. Gard.*, xxxiv, 404, pp. 170–171, 1933.

In the *New York Herald-Tribune* of 8th July, 1933, a special dispatch appeared concerning the presence of the Dutch elm disease [*Ceratostomella ulmi*] at Maplewood, New Jersey, where six trees (one of which died within a fortnight from the detection of the symptoms) were proved to have been attacked by the fungus. In this connexion attention is drawn to the survey in progress by

R. P. White and R. K. Beattie for the purpose of locating and destroying infected trees before widespread damage occurs [*R.A.M.*, xii, p. 733]. Millions of bark beetles (*Scolytus multistriatus*) have been found in one dead elm at Maplewood and are suspected of being concerned in the transmission of the disease. The same insect has also been infecting elms at the New York Botanical Garden and in Westchester County; fairly good control of it may be obtained by early and thorough applications of lead arsenate (3 to 4 lb. per 100 galls. water).

Les pourritures du bois de Chêne sur pied. [The rots of the wood of standing Oak.] (*Bull. 13, Comm. d'études des ennemis des arbres, des bois abattus et des bois mis en œuvre.*)—*Ann. de l'Ecole Nat. des Eaux et Forêts et de la Stat. de Recherches et Expér. Forest.*, iv, 2, pp. 365–380, 400–401, 406–407, 3 pl., 1932. [English and German summaries.]

An account is given in semi-popular terms of a number of rots which attack standing oak trees in France. Of these, white root rot (*Phellinus* [*Polyporus*] *dryadeus*) [*R.A.M.*, xi, p. 680] though fairly common is comparatively unimportant, as affected trees long retain their vigour and the disease never spreads to a height of more than 2 m. above the ground. Brown cubical rot (*P. sulphureus*) [ibid., vii, p. 205] is widespread and more serious than the last as it may cause the entire trunk to become hollow. There is no diagnostic external symptom, but in very old infections a cavity full of pulverulent débris may sometimes be seen at the base of the tree. In yellow trunk rot (*Phellinus* [*Fomes*] *robustus*) [ibid., xi, p. 812] infection always occurs some distance above the ground and remains limited to a short length and to only a part of the circumference. It affects the sapwood chiefly though spreading to the adjacent parts of the heartwood. The bark over the affected sapwood is killed and the trunk, ceasing to increase in diameter at the spot, becomes flattened on one side, the flattening later appearing as a depression bordered by protuberances marking the limits of the still living part of the trunk. A section at this level shows a thin crescent of rotted wood, often round approximately one-half the circumference but never extending to the centre. The affected wood is soft and yellowish and framed by a narrow reddish-brown band. Infection progresses very slowly and the loss sustained through the disease is slight.

In pocket rot the heartwood turns dark brown, irregular white spots appear, and oval cavities develop but remain separated by firm, brown wood. The condition is caused by various species of *Stereum*, chiefly *S. frustulosum* [ibid., v, p. 267]; *Hymenochaete rubiginosa* (*S. rubiginosum*) causes a similar rot, but with smaller pockets. There are no outward signs by which infection by these fungi can be readily detected. The wood rapidly becomes useless. The disease is rather uncommon in France and apparently limited to certain forests. In all these types of rot, infection begins at a place where owing to wound injury the heartwood is exposed.

A rot known in the French timber trade as 'grisette' is characterized by brown spots interspersed with yellowish or whitish stripes or patches. The disease is due to attack by species of

Stereum, chiefly *S. hirsutum* [ibid., x, p. 572; xii, pp. 44, 664], though *S. spadiceum* [ibid., xii, p. 734] is stated recently to have been shown to be also concerned in this type of injury. These fungi become established on dead or broken branches or lopping wounds, and under certain conditions the mycelium passes into the trunk, where it attacks both sapwood and heartwood, spreading in concentric zones in which dark brown, oily spots ('flammes de grisette') appear, elongated in the direction of the axis. These spots spread perpendicularly and tangentially, and the wood turns yellowish or whitish, so that a longitudinal section shows yellow or brown bands separated by white ones. Considerable masses of wood may become discoloured, infection spreading rapidly downwards and slowly upwards from the point of attack. The fungi fructify during winter on the dead branches or the bark of the trunk near by. The coriaceous sporophores, usually grouped or confluent, dry up in summer to a few centimetres in diameter. In *S. hirsutum* the surface of the sporophore is pale yellow and the edges are greyish-yellow; *S. spadiceum* shows a dark grey inner surface and brownish-grey edges.

The grisette disease is serious, as the affected wood is useless. It is also fairly common, infection occurring as branches die or break off in the normal course of events. The trunk may be affected for a distance of 2 or 3 m. below the branch, while a few centimetres above it the wood is still healthy. In most cases the top parts of the trunk suffer a varying degree of depreciation of the timber, but the butt remains unaffected. On standing oak an indication of infection is the presence of circular cushions open at the centre ('gouttières' or 'abreuvoirs') at the insertion of the dead branches. Holes made by woodpeckers under certain nodes indicate a rot of the sapwood which may be associated with the disease.

'Grisette' always results only from the breaking or cutting off of branches, and its spread can therefore be restricted by reducing such types of injury as much as possible.

The paper terminates with directions for controlling the rots by improved sylvicultural methods designed to prevent the trees from developing wounds which leave the wood bare.

La maladie des Platanes. [The Plane tree disease.]—(*Bull. 15, Comm. d'études des ennemis des arbres, des bois abattus et des bois mis en œuvre.*)—*Ann. de l'École Nat. des Eaux et Forêts et de la Stat. de Recherches et Expér. Forest.*, iv, 2, pp. 393–398, 403, 409, 1932. [English and German summaries.]

An account is given in semi-popular terms of the symptoms, causal organism, mode of infection, and control of the leaf spot and twig blight of plane trees caused by *Gnomonia veneta* [*R.A.M.*, xii, p. 735]. The disease occurs all over France, especially when the weather during spring is cool and wet, but is more prevalent in the south-west than in the drier Mediterranean region. It is stated that contrary to the general belief, the variety of plane tree cultivated in France is not *Platanus orientalis* (which comes from the eastern parts of the Mediterranean basin and is grown, very exceptionally, in the south of France only), but *P. acerifolia*,

a hybrid of the former and the North American species *P. occidentalis*. The last-named is almost non-existent in France.

RAINIO (A. J.). **Pseudomonas tumefaciens Sm. & Towns. auf Salix caprea.** [*Pseudomonas tumefaciens* Sm. & Towns. on *Salix caprea*.]—*Ann. Bot. Soc. Zool.-Bot. Fenn. Vanamo*, ii, 3, pp. 3–18, 5 figs., 1932. [Finnish summary.]

A description is given of the formation of brown to jet-black galls, 0·5 to 5 cm. in diameter, on the older branches of two willows (*Salix caprea*) near Helsingfors and Tampere, Finland. The galls were composed of leaf and catkin buds and began to develop in the female catkins in May by the transformation of the floral organs into leaves, the subtending leaves of the flower alone remaining normal. The nectaries were converted into small, branched, loose leaflets, covered with thick, long hairs, the stigma was similarly altered, and the lobes were about the same length as the subtending leaves. The catkin axis was abnormally swollen. The leaf-bud galls were mainly terminal and had three or four terminal leaves of normal size but thickened at the base, the other leaves being lobed and the outer ones covered with hairs. By the end of September all the galls had assumed a brown tinge and a woody consistency, those of the catkins being elongated and those of the leaf-buds round. The bases of the leaf lobes had shrivelled into brown scales and the tips were faded.

Galls of this type do not seem to have been hitherto recorded in Finland, and they are apparently uncommon in other parts of Europe.

The larvae of a beetle (probably *Dorytomus taeniatus*) were traced in some 70 per cent. of the catkin galls examined in 1925 but not in any of those formed from the leaf-buds, so that the insects cannot, in the writer's opinion, be held responsible for the development of the neoplasm, more especially as they also occurred in catkins bearing no galls, and on *S. cinerea* from which the latter were altogether absent. Subsequent investigations confirmed this view.

On staining with methylene blue the surface tissues of the galls were found to contain Gram-negative bacteria, measuring 1·8 to 2 by 1 μ, and with flagella at one extremity. Inoculation experiments with the aqueous extract of ground galls on young *S. caprea* and *Pelargonium* stems gave positive results, the artificially induced galls on the former measuring 1·5 cm. and on the latter 8 to 14 mm. in diameter. An attempt to obtain the causal organism in pure culture was unsuccessful, but in morphological and physiological characters it agrees with *Pseudomonas* [*Bacterium*] *tumefaciens*, which has, moreover, been reported to occur naturally on willows in South Africa [*R.A.M.*, i, p. 17] and Denmark (*Tidsskr. for Planteavl*, xxvii, p. 399, 1920).

A study of the temperature at Helsingfors from 1918 to 1931, the period during which the affected trees were under observation, indicates that gall formation is to some extent dependent on the mean temperature in April. Should this fall below 0° C. no new galls are produced even if normal temperatures prevail in May.

On the other hand, when the mean April temperature exceeds 2° gall formation is profuse.

COLE (J. R.). **Vein spot of the Pecan caused by Leptothyrium nervisedum, n. sp.**—*Journ. Agric. Res.*, xlvi, 12, pp. 1079–1088, 7 figs., 1933.

An account is given of the author's investigation of a foliage disease termed vein spot of pecan (*Hicoria* [*Carya*] *pecan*) found in Louisiana, Mississippi, Arkansas, and Texas, which, though unreported, had been collected in Texas as far back as 1920. The chief symptom, due to vein and petiole infection in the spring, is the development of small oval to circular spots on the leaflets and the formation of large dead areas when the midrib or petiole is attacked, leading to severe defoliation. The spots appear first on the ventral, and four or five days later on the dorsal side of the leaves; at first they are yellowish, then brown, and finally dark brown or black with yellowish margins. Macroscopically the disease is strikingly similar to pecan scab (*Cladosporium effusum*) [*R.A.M.*, xi, p. 213], with which it is believed it may have been confused in the past.

The causal fungus, the pathogenicity of which was experimentally established, is considered to be new and is described (with a Latin diagnosis) as *Leptothyrium nervisedum*. The pycnidia are depressed pulvinate, single or in groups, intra- or subepidermal (occasionally in the spongy parenchyma), of irregular shape, and 35 to 95 μ in diameter. The conidiophores are simple, septate, straight or slightly curved, and 14 to 18 by 2 to 4 μ. The conidia are irregular, oblong or ovate, sometimes curved, hyaline, continuous (but developing a septum at germination), and measure 8 to 13 by 2 to 3 μ; they germinate by germ-tubes from either or both ends. At 15° C. the growth in culture was poor and it ceased at 36°, the optimum being 26°. The optimum hydrogen-ion concentration for growth was P_H 5·9 (range 4 to 8·6). The fungus is believed to live through the winter in the conidial stage.

There was evidence of differences in varietal susceptibility to the disease, especially in Louisiana, where the Van Deman is the most susceptible variety, with Frotscher next. While no experiments for the control of vein spot were made, it was observed to be fairly successfully checked by spraying the trees three times with 3–4–50 Bordeaux mixture, alternating with four applications of 20 parts monohydrated copper sulphate in 80 parts lime, in experiments for the control of pecan scab.

GUYOT (R.). **De la maladie du rond : de l'influence des foyers ou des foyers d'incendie dans sa propagation.** [On the ring disease and on the influence of fires or conflagrations on its spread.]—*Rev. Gén. des Sciences*, xliv, 8, pp. 239–247, 6 figs., 1933.

A summary is given of some important French papers on the so-called 'ring' disease of conifers associated with *Rhizina inflata* [*R. undulata*: *R.A.M.*, xii, p. 550], *Ungulina annosa* [*Fomes annosus*], and *Armillaria mellea*, supplemented by the writer's personal observations on the two last-named in the Gironde and

Landes departments [ibid., ix, p. 279; x, p. 354]. In a recent lawsuit damages were claimed by the owner of a pine stand adjacent to a wood in which the felling operations were followed by the lighting of fires for mechanical and domestic purposes. This led to such a development of *F. annosus* and *A. mellea* as to necessitate the digging of an isolation trench to prevent their spread. Both fungi were found in the roots below the sites of the fires. In collaboration with Hias, the writer has obtained encouraging results in the control of *A. mellea* on pines by exposing the roots and painting them with an iodine solution (0·5 per cent.), while experiments are also in progress with a method of injecting the iodine.

Root (G. A.). **Blister rust activities in California in 1932.**—*Thirteenth Ann. Rept. Dept. of Agric. California for the period ending December 31, 1932* (*Monthly Bull. Dept. of Agric. California*, xxi, 12), p. 570, 1932. [Received August, 1933.]

At the close of 1932, the ninth year of active pine blister rust [*Cronartium ribicola*] work was completed in California, and during the period under review a very important new project was started in the form of a sugar pine [*Pinus lambertiana*] inventory of the entire State, a joint undertaking with the United States Forest Service. The survey will show the order in which protective measures in different areas should be executed and the estimated cost of the work. During 1932 an initial eradication of wild currant and gooseberry bushes from 800 acres took place in the Stanislaus National Forest, as well as a re-eradication of 3,000 acres first worked in 1928 [*R.A.M.*, xi, p. 143]. So far no trace of the rust has been detected by vigilant inspections in the north of California and parts of the Sierra Nevada, but the southernmost location of infection is apparently in south-western Oregon, less than 50 miles from the Californian boundary.

Lindgren (R. M.). **Field observations of needle rusts of Spruce in Minnesota.**—*Phytopath.*, xxiii, 7, pp. 613–616, 1933.

This is an extended account of the writer's observations on the needle rusts of spruce (*Picea mariana*, *P. pungens*, *P. glauca* and its var. *albertiana*, and *P. excelsa*) caused by *Melampsoropsis cassandrae*, *M. abietina*, and *M. ledicola* [*R.A.M.*, vi, p. 450] in Minnesota, a note on which has already been published [ibid., xii, p. 67].

Statutory rules and orders, 1933, No. 558. Destructive Insect and Pest, England. The Importation of Plants Order of 1933. Dated June 7, 1933.—8 pp., 1933.

The Importation of Plants Order of 1933, effective as from 15th July, 1933, and superseding all previous Orders under the Destructive Insects and Pests Acts, 1877 to 1927 [*R.A.M.*, xi, p. 543], prohibits the landing in England or Wales of all living plants or parts thereof (except seeds) for planting, unless accompanied by a duly authenticated certificate guaranteeing the absence from the consignments of any insect, fungus, or pest destructive to agricultural and horticultural crops. All potatoes must have a further

certificate vouching for the freedom of the place of cultivation and of a surrounding radius of 2 km. from wart disease (*Synchytrium endobioticum*), while the importation of potatoes (tubers, leaves, or stalks) from the United States, Canada, and France is entirely prohibited. All plants (and between 15th March and 14th October each year, raw vegetables and cider apples) from France must have a certificate that Colorado beetle (*Leptinotarsa decemlineata*) has not been known to exist within 200 km. of the place where they were grown. The Order places no restrictions on the landing or transhipment in England or Wales of any produce grown in Scotland, Ireland, the Isle of Man, or the Channel Islands. An authorized inspector may enter any premises and take samples of consignments of plants, potatoes, raw apples, or raw vegetables landed or suspected of having been landed in England or Wales, even if accompanied by the requisite certificates. In the event of such samples being found affected by any injurious insect or fungus pest, the importer may be required to take certain specified steps for disinfection or treatment or alternatively to destroy or re-export the consignment in part or entire. The provisions of this Order do not preclude the issue of licences by the Minister of Agriculture or a qualified inspector for the importation into England or Wales of plants, potatoes, raw apples, or raw vegetables.

Similar regulations have been introduced in Scotland.

Statutory Rules and Orders, 1933, No. 557. Destructive Insect and Pest, England. The Destructive Insects and Pests Order of 1933. Dated June 7, 1933.—3 pp., 1933.

This order, which came into operation on 15th July, 1933, prohibits the keeping, sale, or release of any insect (which is defined to include bacteria and other vegetable or animal organisms causing plant disease) of a non-indigenous species except under licence of the Minister of Agriculture. Provision is made for the inspection of suspected premises, and for the destruction of infectious material if required.

A similar order is made with regard to Scotland.

Amtliche Pflanzenschutzbestimmungen. [Official plant protection regulations.]—*Beil. Nachrichtenbl. Deutsch. Pflanzenschutzdienst*, v, 1, pp. 28, 38–39, 42, 51–54, 1933.

Germany (Rhine Province). From 18th November, 1932, to 1st October, 1942, all Canadian poplars [*Populus canadensis*] in the Düsseldorf district suspected of canker (*Nectria coccinea* var. *sanguinella*) [*R.A.M.*, x, p. 698] or dying-off (*Dothichiza populea*) [see above, p. 790] must be officially inspected by the competent authorities and any diseased trees destroyed.

Esthonia. An Order of 18th November, 1932, requires the eradication of buckthorn (*Rhamnus cathartica*) and barberry (*Berberis vulgaris* and its var. *atropurpurea*) with a view to combating the cereal rusts caused by *Puccinia coronifera* [*P. lolii*] and *P. graminis*, respectively. The work must be carried out within three years both on public and private lands [cf. ibid., xii, p. 672].

INDEX OF AUTHORS

	PAGES
Aamodt, O. S.	277
Abbott, E. V.	114, 724
Acton, H. W.	217
Adam, D. B.	97, 110, 414
Adams, J. F.	107, 267, 612
Adams, P. D.	531
Aganostopoulos, P. T.	469
Aggarwal, K. L.	605
Aggéry, B.	97, 373, 417
Agostini, A.	171
Ahmet, H.	387, 714
Aichelburg, U.	568
Aimé, P.	631
Ainsworth, G. C.	730
Ajrekar, S. L.	367
Alben, A. O.	339
Albrecht, W. A.	109
Aldrich-Blake, R. N.	582
Alexandri, A. V.	666
Allen, F. W.	103
Allen, R. F.	164, 362, 632, 782
Allhusen, E. L.	511
Almeida, F. P. de	440
Anderson, A. K.	531
Anderson, F. G.	575
Anderson, H. W.	455, 572
Andreyeff, I. E.	260, 261
Annand, P. N.	195
Anrès, M.	301
Appel, O.	662
Arakawa, S.	593
Arland, A.	431
Arnaud, G.	558, 682
Atanasoff, D.	229, 252
Avellaneda, R.	629
Ayyar, V. K.	568
Babel, A.	501
Badami, B. S. R.	340
Badoux, J.	67
Baehni, C.	743
Bagster, L. S.	40
Bailey, A. A.	316
Bailey, C. H.	757
Bailey, H. L.	188
Baines, R. C.	298
Baker, K. F.	226, 574
Bald, J. G.	526
Baldacci, E.	779
Ballagi, S.	289
Bally, W.	168
Bankul, E. A.	753
Barnes, B. F.	432
Barnett, G. B.	576
Barr, H. T.	740
Barthelet, J.	517
Barton-Wright, E.	48
Bauch, R.	88
Baudet, E. A. R. F.	172
Baxter, D. V.	543
Beale, H. P.	398
Beard, F. H.	785
Beattie, R. K.	733
Beauverie, M. A.	808
Becker, K. E.	84, 152
Beckwith, C. S.	706
Becze, G. v.	39
Bedi, K. S.	264
Beeley, F.	323
Beliayeff, I. A.	253
Bell, A. F.	114, 245, 329, 786
Benlloch, M.	416
Bennett, C. W.	770
Bennett, F. T.	754
Bennett, S. C. J.	172
Benton, R. J.	576, 759
Beran, F.	523
Berg, A.	378
Bergamaschi, M.	235
Berger, E. W.	567
Berkeley, G. H.	250, 540
Biraghi, A.	751
Birkeland, J. M.	398
Birmingham, W. A.	231, 377
Bisby, G. R.	534, 579
Blanchard, E. E.	683
Blank, I. H.	94, 233
Blattný, C.	165, 294, 326
Blauvelt, W. E.	699
Bleecker, W. L.	376
Bloch, B.	569
Blochwitz, A.	396
Blodgett, F. M.	390, 653
Blood, H. L.	461
Blum, P.	511
Bolens, G.	677
Bolley, H. L.	220
Bonar, L.	508, 629
Bondartzeff, A. S.	182
Bonde, R.	240
Bongini, V.	27, 641
Böning, K.	350, 476, 729
Booberg, G.	57
Bordeleau, R.	475
Borghardt, A. I.	165, 616
Bornmüller, J.	375
Bortels, H.	680
Bose, S. S.	439
Bosher, J. E.	96
Bouat, A.	711
Bouriquet, G.	352, 680
Bourne, B. A.	467
Bovey, P.	450
Boyd, O. C.	407
Boysen, H.	189
Bradford, F. C.	636
Brandenburg, E.	2
Brann, J. W.	50
Bratley, C. O.	102
Braun, K.	31, 746
Bredemann, G.	524
Bremer, H.	514, 662, 740
Brentzel, W. E.	618
Bressman, E. N.	156, 428, 563, 656

	PAGES
Brien, R. M.	179, 719
Brierley, P.	374, 697
Briggs, F. N.	84
Briton-Jones, H. R.	433, 522, 756
Britton, W. E.	335
Broadfoot, W. C.	83, 561, 683, 684
Brochet, L.	630
Brodie, H. J.	186
Brooks, C.	102, 378
Brown, A. M.	208, 235
Brown, B. E.	654
Brown, J. G.	262, 270, 405, 412
Brown, J. N.	699
Brown, N. A.	224
Bruschetti, C.	498
Bryan, M. K.	81, 547
Bryant, M. W.	575
Bubolz, A. A.	691
Buddin, W.	611
Bugnicourt, F.	146
Buisman, C.	126, 665, 734
Buller, A. H. R.	776
Bunschoten, G. E.	780
Bunting, R. H.	207
Burges, A.	311
Burk, A.	468
Burke, O. D.	390, 653
Burkholder, C. L.	30
Burkholder, W. H.	71, 97
Burnham, C. R.	95
Burnier	511, 569
Burton, G. J. L.	13
Busse, G.	156, 210
Butcher, R. W.	58
Butler, E. J.	566
Butler, J. B.	93
Butler, O.	236
Butler, W.	427
C., J. H.	597
Cadoret, A.	198
Cairns, H.	211, 466
Caldwell, J.	527
Calfee, R. K.	611
Callaudaux, R.	675
Cambonie, L.	252
Campanile, S.	584
Campbell, A. H.	544
Campbell, E.	195
Campbell, W. G.	342
Campos Goes, O.	57
Canonici, O.	445
Cappelletti, C.	449
Carbone, D.	445
Carneiro, J. G.	707
Carolus, R. L.	654
Carrera, D. C.	683
Carter, D. G.	740
Carter, W.	304, 520, 521
Cash, L. C.	688
Castellani, A.	117
Catanei, A.	288, 510
Cathcart, C. S.	708
Cecconi, G.	334
Cerri, L.	218
Cerutti, P.	568
Chabrolin, C.	302, 487
Chalaud, G.	235
Challenger, F.	713
Chamberlain, E. E.	122, 193, 403, 719, 733
Chamberlin, J. C.	195
Chandler, N.	417
Chandler, W. H.	99
Chapman, A. D.	344, 407, 411, 668
Chardon, C. E.	246, 396
Charles, V. K.	385
Chaudhuri, H.	369
Chavarria, P.	444
Cheal, W. F.	452, 453
Chen, C. C.	641
Chen, H. K.	363
Cheney, G. M.	134
Child, M.	193
Childs, L.	300
Chittenden, E.	573
Chona, B. L.	184, 241
Chow, C. H.	331
Chrestian, J.	352
Christensen, C.	332
Chupp, C.	42, 70, 656
Churchward, J. G.	85. 275
Ciferri, R.	171, 174, 193, 396, 723, 726
Clark, J. A.	275, 500
Claypool, L. L.	769
Clayton, E. E.	401, 402
Cocchi, F.	783
Cochran, L. C.	196, 416
Cockerham, G.	388
Cole, J. R.	339, 798
Coleman, L. C.	435
Combs, W. B.	219
Condit, I. J.	382
Conn, H. J.	324
Conners, I. L.	551
Connor, J. I.	444
Cook, H. T.	417, 484, 633, 673
Cook, M. T.	114, 657
Cook, W. R. I.	466, 468
Cooley, J. S.	102, 453
Cooley, L. M.	230
Corneli, E.	491, 497, 541, 681
Cornell, F. D.	642
Corner, E. J. H.	55
Cornu, C.	138
Costa, T.	349
Costantin, J.	56, 394, 395
Cottam, C.	645
Cotter, R. U.	14, 86, 87
Cottier, W.	134
Cottrell-Dormer, W.	114
Coulson, J. G.	296
Coulter, S. T.	219
Countryman, M. C.	637
Craigie, J. H.	318
Creager, D. B.	374
Creuzé, P.	631
Crosby, C. R.	70, 71, 699
Crosier, W. F.	190
Cross, W. E.	468, 594
Cruess, W. V.	379
Crüger	773
Csorba, Z.	517
Cummins, H. A.	24, 44(
Cunningham, G. H.	41
Currie, J. F.	236
Curzi, M.	229, 246, 373

	PAGES
Da Camara, E. de S.	725
Dahl, A. S.	450
Dana, B. F.	349, 351
Darker, G. D.	254
Darrow, G. M.	381
Das Gupta, S. M.	217
Das Gupta, S. N.	377, 573, 782
Dastur, J. F.	659
Davidson, A. M.	23, 218, 219, 693
Davies, W. M.	236
Davis, C. L.	692
Davis, F. V.	445
Davis, L. D.	103
Davis, R. L.	113, 394
Davis, W. H.	450
Day, W. R.	334, 341
Deacon, G. E.	570
Dearness, J.	772
De Barbieri, E.	629
Deighton, F. C.	201, 552
De Jager, H.	781
De Jong, J. K.	248
De Jong, W. H.	720
De Jonge, L. J. A.	372
Del Cañizo, J.	381
Demaree, J. B.	129
Demeter, K. J.	220, 785
D'Emmerez de Charmoy, D.	327, 328
Dennis, R. W. G.	163
De Ong, E. R.	182
Desai, M. K.	393, 432
Dessy, G.	693
Detwiler, S. B.	381, 739
Dey, P. K.	566
Dickinson, S.	579, 782
Dickson, A. D.	432
Dickson, J. G.	159, 313, 432, 620
Diehl, W. W.	698
Dijkstra, G. K.	485
Dillon Weston, W. A. R.	504
Dippenaar, B. J.	389
Director, W.	630
Dix, W.	322, 651
Dixon, S.	87
Dixon-Stewart, D.	242
Djelaloff, R.	559, 589
Doak, K. D.	385
Dobromysloff, P. N.	155
Dodds, H. H.	326
Dodge, B. O.	131, 794
Dodoff, D. N.	681
Doidge, E. M.	197
Donandt, S.	116
Doran, W. L.	5
Dorph-Petersen, K.	294
Down, E. E.	414
Downes, A. C.	223
Dowson, W. J.	271
Doyer, L. C.	72
Drayton, F. L.	292
Drechsler, C.	512, 761, 762
Dreyer, A. D.	629
Duché, J.	288, 511, 569
Ducomet, V.	489
Dufestel, L.	694
Dufrénoy, J.	198, 419, 476
Duggar, B. M.	461, 648
Dunegan, J. C.	226, 228
Du Plessis, S. J.	4, 6, 135, 192, 380, 764
Dupont, E.	675
Dupont, P. R.	144
Dusseau, A.	275
Dutton, W. C.	28
Eastham, J. W.	678
Eddins, A. H.	366, 431
Eftimiu, P.	583
Eglits, M.	319
Ehrlich, J.	404
Eichinger	651
Eidelman, Z. M.	751, 753
Elford, W. J.	646
Elliott, C.	364, 431
Ellis, D.	370
Emiliani, E.	434
Esau, P.	379
Evans, M. M.	262, 405, 412
Evans, R. I.	610
Everitt, E. L.	531
Eyre, J. C.	47
Ezekiel, W. N.	96, 291
Faes, H.	8, 450
Falchi, G.	371
Faris, J. A.	363
Fawcett, G. L.	786
Fawcett, H. S.	89, 212, 213, 368, 625, 690
Feistritzer, W.	157
Felix, E. L.	416
Ferguson, J. H.	308
Ferrari, A.	219
Fikry, A.	286
Filinger, G. A.	516
Filippoff, G. S.	339
Finch, A. H.	602
Findlay, W. P. K.	68, 607
Finkenbrink, W.	391
Finlayson, E. H.	123, 342
Fiore, M.	639
Fischer, R.	25, 135, 302
Fischer-Piette, E.	308
Flachs, K.	485
Flor, H. H.	156
Foëx, E.	75, 489, 560, 626, 685
Folsom, D.	187
Foster, W. R.	241, 772
Fr.	765
Fracanzani, G. A.	540
Frappa, C.	675
Fraser, L.	310
Fraser, W. P.	364
Freitag, J. H.	446
Frickhinger, H. W.	242, 376
Friebe, P.	531
Friedrichs, G.	558
Fritz, C. W.	344, 545
Fujii, S.	94
Fukushi, T.	598
Gadd, C. H.	597, 661
Gaines, E. F.	156, 617
Gaines, J. G.	402
Gandrup, J.	286
Garbowski, L.	207, 716
Gard, M.	603
Gardner, W. M.	298
Garr, C. C.	628
Garrett, S. D.	159

PAGES

Gassner, G. 272, 273, 274, 382, 499
Gaudineau, M. . . 429, 558, 682
Gäumann, E. . . 132, 195, 278
Gauthier, M. 511
Gelaloff, R., *see* Djelaloff, R.
Gentner, G. 278
Genty, P. 198
Georgevitch, P. 600
Geyr, H. v. 66, 67
Gheorghiu, I. 496
Ghesquière, J. 137
Ghimpu, V. . . . 580, 791
Ghosh, M. N. 535
Gibbs, J. G. 412
Gigante, R. . . 319, 458, 784
Gilgut, C. J. 407
Gill, L. S. 67
Gilman, R. L. 508
Ginet, J. 253
Ginsburg, J. M. 711
Gioelli, F. 168
Gloyer, W. O. 687
Godbout, F. L. 296
Goetz, O. 175, 642
Goeze, G. 382
Goidànich, G. . . 337, 587, 769
Goldsworthy, M. C. 709
Goodwin, W. . . . 100, 101
Gordon, W. L. 280
Görnitz, K. 577
Gougerot, H. . . . 288, 511
Graham, J. J. T. 708
Grahn 158
Grainger, J. . . . 727, 791
Grant, T. J. 108
Graser, H. 480
Gravatt, G. F. 387
Graves, A. H. 601
Greaney, F. J. . 426, 502, 504, 560
Green, D. E. . . . 26, 764
Green, E. L. 709
Green, F. M. 167
Greene, H. C. 529
Gregor, M. J. F. 132
Gregory, P. H. . 23, 218, 219, 224, 693
Grieve, B. J. 447
Grigorakis, L. . . . 28, 442
Grimes, M. . . . 24, 440
Grimshaw, A. H. 24
Grossmann, H. . . . 194, 408
Grubb, N. H. 771
Gruber, F. 519
Guba, E. F. . . . 57, 249
Guinier, P. 604
Guiscafré, J. R. 867
Gunn, K. C. 628
Günnewig, J. 778
Guterman, C. E. F. 97
Gutner, L. 631
Guyot, A. L. . . . 157, 177
Guyot, R. 798
Gyde, L. M. 169

H. 258
Haas, A. R. C. . . . 542, 690
Hachiya, T. 804
Hahmann, C. 175
Haler, D. H. 692
Hall, A. D. 688

PAGES

Hall, M. P. 781
Hamilton, M. A. 243
Hammarlund, C. . . 293, 329
Hammer, B. W. 695
Hanna, W. F. . . . 277, 751
Hansbrough, J. R. . . 341, 407
Hansen, H N. 316
Hansen, H. P. 262
Hansford, C. G. 421
Hård av Segerstad, F. . . . 666
Harding, D. B. 628
Harrington, F. M. 49
Harris, H. A. 124
Harris, J. J. 513
Harris, L. E. 428
Harris, R. V. . . 487, 519, 771
Harter, L. L. . . . 1, 671
Hartley, C. 405
Haselhoff, E. 524
Haselhoff, W. 524
Hashioka, Y. 726
Hassebrauk, K. . . 15, 273, 274
Hastings, R. J. 96
Hatch, A. B. . . 885, 886, 778
Hatch, C. T. 778
Hawkins, S. 60
Hayes, T. R. 5
Heafford, R. M. 727
Heald, F. D. . . 226, 295, 574
Hector, G. P. 420
Hedgcock, G. G. 669
Heim, R. 308, 711
Heimbeck, L. S. 412
Hellinger, E. . . . 20, 21, 284
Hemmi, T. 784
Hendee, E. C. 460
Henderson, C. F. 195
Henderson, R. G. 473
Henricksen, H. C. 166
Henry, A W. . . . 18, 621
Henry, L. K. 712
Herter, W. G. 198
Hesseltine, H. C. 870
Heuberger, J. W. 402
Hewison, R. 91
Hibbard. P. L. 99
Hicks, E. W. 40
Hines, L. 427, 753
Hintikka, T. J. 50
Hirane, S. 881
Hirata, E. 564
Hiratsuka, N. . . . 596, 726
Hoagland, D. R. 99
Hockenyos, G. L. 181
Hockey, J. F. 35, 299
Hoerner, G. R. 111
Hoffman, I. C. 668
Hoffmann, W. 283
Hoggan, I. A. 678
Höhnel, F. v. 634
Höhnk, W. 880
Holbert, J. R. 864
Hollaender, A. 461
Holmes, F. O. . . . 118, 119
Holmes Smith, E. . . 403, 546
Holton, C. S. . . . 481, 622
Homma, Y. 650
Hooton, D. R. 627
Hoover, M. M. 865

PAGES

Hope, C. 287
Hopfe, E. 745
Hopffgarten, E. H. v. . . . 738
Hopkins, J. C. F.
58, 476, 727, 748, 775, 794
Horne, A. S. 32
Horne, W. T. 382
Horsfall, J. G. . . 122, 282, 671
Houdayer, C. 301
Houghland, G. V. C. . . . 654
Howitt, J. E. 295
Huang, P.-T. 442
Huber, G. A. . . . 295, 517
Hubert, K. 208
Huelin, F. E. 40
Hughes, W. 481
Hulsey, S. 370
Humphrey, C. J. . . . 116
Humphries, A. 93
Hungerford, C. W. . . 367, 449
Huron, W. H. 173
Hurwitz, S. 239
Hus, P. 705
Husfeld, B. 548
Hutchins, L. M. 37
Hüttig, W. . . . 16, 650
Hwang, L. 363

Ikata, S. 1
Irwin, G. R. 181
Isa, J. M. 372
Itano, A. 593
Ito, S. 532, 605
Ivanoff, S. S. 364
Iyengar, C. S. R. . . . 340

Jacks, W. R. 601
Jackson, L. W. R. . . . 405
Jacobson, H. G. M. . . . 477
Jacobson, H. P. 217
Jagger, I. C. 417
James, N. 534
Jancke, O. 298, 517
Janke, A. 523
Jarrett, P. H. 18
Jarvis, T. D. 108
Jausion, H. 694
Jelsma, F. 629
Jenkins, A. E.
95, 291, 449, 595, 625, 661, 689
Jenny, H. 109
Jensen, H. L. . . . 241, 324
Jensen, J. H. 538
Jermiess 782
Jochems, S. C. J. . . 332, 470, 662
Joëssel, P. H. 301
Johann, H. . . . 159, 620
Johnson, A. G. 431
Johnson, E. M. 117
Johnson, H. B. 102
Johnson, J. . . . 108, 539
Johnson, T. . . . 14, 208
Jöhnssen, A. 587
Johnston, C. O. . . . 151, 427
Johnston, J. C. 434
Joley, L. 636
Jones, H. A. 547
Jones, L. K. . . . 71, 333
Jones, L. R. 448

PAGES

Jones, W. 325
Jørgensen, C. A. . . . 709, 715
Jungherr, E. L. 371

Kaden, O. F. . . . 168, 761
Kadow, K. J. . . . 71, 455
Kalandra, A. 340
Kambayashi, T. 290
Kanouse, B. B. 93
Kapshuk, A. A. 516
Karatschewsky, I. K. . . . 778
Katser, A. 702
Kaufert, F. H. 409
Kawatsuré, S. 694
Keating, P. M. 172
Kelbert, D. G. A. 60
Kendall, J. 59
Kennelly, V. C. E. . . . 440
Kerling, L. C. P. 474
Kern, F. D. . . . 246, 396
Kertesz, Z. I. 671
Keur, J. Y. 375
Keyssner, E. 148
Khokhryakoff, M. 631
Khouri, J. 218
Kidd, F. 33
Kienholz, J. R. 299
Kilduff, T. 428
King, C. G. 287
Kinnison, A. F. 602
Klapp, E. 461
Klebahn, H. 789
Klein, G. 148
Klemm, M. . . . 150, 266, 686
Klotz, L. J. 690
Knudson, L. 712
Kobel, F. 548
Koch, K. L. 588
Koch, L. W. 704
Koehler, B. 364
Köhler, E. . . . 477, 586, 587
Kolbe, R. W. 634
Kopp, A. 327, 328
Kordes, H. 417, 663
Kostoff, D. . . . 59, 599, 728
Kotchkina, E. M. 251
Kraatz, W. H. 178
Krause, A. 17
Kravtzeff, B. I. 666
Krebber, O. 312
Kresser, H. 631
Krüger, K. 238
Kubiena, W. 191
Kühlmorgen 322
Kuhnholtz-Lordat, G. . . . 578
Kumazawa, M. 176
Kunkel, L. O. . . . 186, 518
Kuntz, P. E. 394
Kurosawa, E. 590
Küster, E. 409
Kuula, O. 411
Kwashnina, E. S. 507

Labrousse, F. 488
Lachmund, H. G. . . . 341, 603
Lacorte, C. G. 709
Lagerberg, T. 667
Laing, E. V. . . . 183, 529
Lambert, E. B. 352

	PAGES
Lami, R.	308, 711
Landgraf, T.	97
Lange, L.	298
Langner, W.	604
Larsen, P.	469
La Rue, C. D.	529
Laubert, R.	381, 447, 578
Lauritzen, J. I.	4, 671
Lavroff, N. N.	306
Leach, J. G.	744
Leach, R.	9, 332, 537
Le Clerg, E. L.	196
Ledingham, G. A.	358, 364
Leefmans, S.	425
Léger, L.	511
Legge, R. T.	508
Lehman, S. G.	455
Lehner, E.	289
Lemesle, R.	292
Lendner, A.	194
Lester-Smith, W. C.	166
Leus-Palo, S.	116
Levine, M.	358
Levine, M. N.	87
Lewis, R. D.	339
Lido, S.	508
Liebesny, P.	443
Liese, J.	66, 68, 255, 406, 667
Likhite, V. N.	367
Liming, O. N.	252, 403, 460
Lindeijer, E. J.	60
Lindgren, R. M.	67, 344, 407, 410, 411, 799
Lindquist, J. C.	535
Ling, L.	725
Linggood, F. V.	644
Link, K. P.	432, 672
Lobik, A. I.	505
Loewel, E. L.	80, 297
Lohwag, H.	486
Lomholt, S.	95
Loos, W.	195
Loschakowa-Hasenbusch, N.	250
Loughnane, J. B.	717
Lourier, A. G.	173
Lowig, E.	620
Ludbrook, W. V.	470
Ludorff, W.	695
Lüdtke, M.	314, 387
Ludwigs, K.	766
Lundegårdh, H.	19
Luthra, J. C.	212, 264
Ma, R. M.	656, 721
MacBryde, C. M.	441
Machacek, J. E.	502, 560
Macindoe, S. L.	361
Mackinnon, J. E.	631
MacLeod, H. S.	241
MacTavish, J.	739
Macy, H.	219
Madden, G. O.	250, 540
Mader, E. O.	390, 391, 653
Madson, B. A.	177
Magee, C. J.	320
Magrou, J.	583
Magrou, M.	583
Mahalanobis, P. C.	489
Maier-Bode	161
Mains, E. B.	151, 362, 499
Maire, R.	626
Majdrakoff, P.	161
Malençon, G.	626
Mallamaire, A.	91
Malloch, J. G.	277
Mannozzi Torini, L.	85
Manns, T. F.	220, 267
Manson-Bahr, P.	172
Manuel, H. L.	265
Manzoni, L.	73, 199
Marchal, E.	7, 676
Marchal, P.	75
Marett, P. J.	692
Marritt, J. W.	530
Marsais, P.	577
Martens, P.	186
Martin, G. W.	115
Martin, H.	305, 576, 774
Martin, J. P.	113, 722
Martin, W. H.	188
Martinez, J. B.	480
Martinoff, S.	252
Martyn, E. B.	10, 469
Massee, A. M.	772
Massey, L. M.	25, 449, 696
Matsumoto, H.	589, 719
Matsumoto, T.	43, 331, 598
Matsuura, I.	584
Matz, J.	660
Matzulevitch, B. P.	610
Maume, L.	711
Mayne, W. W.	22, 285, 436
Mazza, S.	288
McBain, A.	48
McBride, J. S.	70
McCallan, S. E. A.	106, 710
McClean, A. P. D.	658
McCormack, R. B.	390, 653
McCubbin, W. A.	742
McCulloch, L.	129
McDonald, J.	8
McGuire, L. P.	104, 121, 794
McHargue, J. S.	611
McKay, R.	47
McKenzie, M. A.	408
McLarty, H. R.	701
McLuckie, J.	311
McNamara, H. C.	627, 628
McRae, W.	192, 551
McWhorter, F. P.	292, 351
Mead, H. W.	363
Mehrlich, F. P.	106, 303
Meier, F. C.	385
Melchers, L. E.	749
Mendoza, J. M.	115, 248
Meriin, J. A.	289
Merkenschlager, F.	535
Meurs, A.	383
Meyer, A.	74
Meyer, J.	511
Meyer-Bahlburg, W.	210
Meyer-Hermann, K.	609, 652, 718
Mielke, J. L.	407, 543
Miestinger, K.	135
Migita, N.	480
Mihra, R. D.	508
Milan, A.	209, 558
Milbrath, D. G.	515

	PAGES
Milburn, M.	337
Miles, L. E.	92
Miller, E. C.	427
Miller, E. V.	102
Miller, H. E.	290
Miller, P. R.	100, 493, 679
Miller, P. W.	338, 601
Miller, V. V.	257
Mills, W. D.	104, 699
Mills, W. R.	190
Minkevičius, A.	45
Mirimanoff	713
Mitter, J. H.	395
Mittmann, G.	650
Mix, A. J.	701
Möhring, K.	570
Moir, G. M.	696
Monteith, J.	450
Montet, D.	197
Mook, P. V.	102
Moore, E. J.	384, 691
Moore, E. S.	791
Moore, H. C.	654
Moore, M.	170, 440
Moore, M. H.	297, 639, 766, 767
Moreau, F. v.	321
Morgan, G. F. V.	696
Moritz, O.	19
Morris, R. T.	601
Morrow, H.	290
Morrow, M. B.	56
Morstatt, H.	775
Morwood, R. B.	271
Mossel, H.	220, 785
Motte, M. H.	607
Mounce, I.	340
Mourashkinsky, K. E.	153, 154
Mout, M. G.	724
Müller, K.	653
Müller, K. O.	465
Muncie, J. H.	187
Mungomery, R. W.	786
Murphy, P. A.	47
Murray, H. L.	236
Murray, R. K. S.	392, 591, 655, 720, 784
Muskatblit, E.	509, 629, 630, 694
Muskett, A. E.	211, 466
Nakamura, T.	219
Nance, N. W.	121
Nannfeldt, J. A.	530
Nannizzi, A.	293
Nanta, A.	445
Napper, R. P. N.	52, 54
Narasimhan, M. J.	76, 479
Nattrass, R. M.	323, 506, 747
Neal, D. C.	216, 439
Neatby, K. W.	750
Neff, P.	604
Negodi, G.	536
Negroni, P.	695
Neill, J. C.	496, 608, 744
Nelson, C. I.	372
Nelson, R.	414, 416, 565
Němec, B.	62, 554, 563
Neuweiler, E.	189
Neuwirth, F.	193, 348, 545
Newhall, A. G.	42
Newton, M.	14, 208
Newton, W.	96
Nichols, R. A.	656
Nicolas, G.	97, 417
Nielsen, O.	715
Niethammer, A.	264, 534
Nieves, R.	682
Nikolaieff, V. A.	625
Nilsson, E.	618
Niño, F. L.	441, 629, 630
Nishimura, J.	304
Nisikado, Y.	99, 589, 606, 719
Nissen, W.	137
Nitsche, G.	577
Noble, R. J.	430
Nolla, J. A. B.	398, 401
Nord, F. F.	386
Norman, A. G.	393, 533
Norton, J. B. S.	402
O'Brien, D. G.	163
Ocfemia, G. O.	245
O'Connor, M.	24
Oettingen, H. v.	571
Ogilvie, L.	25, 346
Okabe, N.	554
Olson, H. C.	695
Orchard, O. B.	524, 744
Orton, C. R.	426
Osmun, A. V.	493
Ota, M.	442, 694
Ouspensky, B.	694
Overholser, E. L.	769
Overley, F. L.	769
P., L.	135
Padwick, G. W.	621
Paine, S. G.	644
Palamedi, B.	288
Palm, B. T.	116, 169, 177, 307, 397, 468
Palo, M. A.	521
Pampana, E. J.	173
Paoletti, V.	521
Pape, H.	447, 570
Parham, B. E.	296
Parisi, R.	660
Park, M.	77, 248, 433, 689, 773
Parker, K. G.	766
Parsons, B.	25, 696
Pasinetti, L.	184, 185
Pasricha, C. L.	217
Passmore, F. R.	149
Paul, L.	677
Paxton, G. E.	755
Peace, T. R.	334
Pearson, R. S.	342
Peklo, J.	360
Peltier, G. L.	221, 360, 556, 636
Pérez, B.	629
Perlberger, J.	90
Perrault, C.	452
Perret, C.	491
Person, L. H.	415
Persons, T. D.	92
Petch, T.	216
Petersen, E. J.	347
Petherbridge, F. R.	774
Pethybridge, G. H.	223
Petit, A.	151, 153, 271
Petri, L.	214, 418, 745

	PAGES
Peutz, J. L. A.	289
Peyronel, B.	309
Pfeiffer	180, 353
Philipp, W.	239
Picado, C.	437
Pichler, F.	153, 623
Pickett, W. F.	516
Pierson, R. K.	668
Pierstorff, A. L.	102
Pilát, A.	410
Pittman, H. A.	622
Plantenga, M. H. J.	43
Pole Evans, I. B.	142
Pollacci, G.	200
Pomerleau, R.	479
Poole, R. F.	227, 462
Popp, W.	751
Porsch, L.	135
Porter, C. L.	109
Porter, D. R.	197, 547
Post, T. B.	763
Powers, L.	500, 753
Pretorius, W. J.	750
Price, W. C.	120
Pugh, G. W.	159, 620
Punte ., V.	173
Putterill, K. M.	162
Quayle, H. J.	690
Quisenberry, K. S.	500
R., H.	737
Rabinovitz-Sereni, D.	214, 283
Rademacher, B.	86
Radulescu, E.	619
Raiford, T. S.	22
Rainio, A. J.	797
Raleigh, W. P.	388, 391
Rand, F. V.	688
Rang	239, 321
Rankin, W. H.	251, 640
Raper, K. B.	384
Raphael, T. D.	36, 177
Rapin, J.	677
Rath, L.	670
Rathsack, K.	239
Rauterberg, E.	651
Ravaz, L.	72, 73, 200, 420, 675
Rawlins, T. E.	234, 401, 525
Rayner, M. C.	506
Rayss, T.	20
Read, F. M.	215
Read, W. H.	524. 731
Reddick, D.	190, 784
Reed, G. M.	562
Regueral, F. G.	369
Reichert, I.	20, 21, 90, 284, 368
Reid, R. D.	387
Reiff, M. G.	173
Reinmuth, E.	391
Remsberg, R.	367
Reydon, G. A.	760
Reyes, G. M.	216, 217
Ribereau-Gayon, J.	674, 710
Riccardo, S.	707
Rice, M. A.	387
Richards, B. L.	461
Richardson, P.	326
Richmond, B. G.	125
Richter, H.	66, 257
Ricks, G. L.	451
Riehm, E.	277, 643
Riess, G.	695
Říha, J.	322
Riker, R. S.	448
Rippel, K.	194, 713
Rischkow, V. L.	778
Ritchie, J. H.	130
Rivera, V.	82, 491, 681, 715
Rivier, A.	111, 150
Robak, H.	69, 543
Roberts, J. W.	228
Robertson, H. T.	561
Robinson, A. D.	699
Rochlin, E.	346
Rodenhiser, H. A.	89, 432
Roepke, W. K. J.	478
Rogers, J. B.	629
Rohde, T.	65
Roldan, E. F.	383
Root, G. A.	799
Roque, A.	793
Rosella, E.	560, 685
Rosen, H. R.	225, 376, 699
Rotter, W.	444
Rouayroux, R.	420
Routala, O.	411
Roy, A. C.	217
Ruggieri, G.	758, 759
Runnels, H. A.	459, 657
Rupprecht, G.	123
Russell, T. A.	421
Ryberg, O.	507
Sacchetti, M.	434
Salaman, R. N.	581
Sallans, B. J.	501, 561
Salmon, E. S.	100, 101, 111, 112, 242, 353, 576
Sampaio, N.	442
Sampson, K.	222, 755
Samuel, G.	141, 159, 526
Sanborn, J. R.	545, 607
Sanford, G. B.	83, 462, 530, 635, 785
Sardiña, J. R.	377, 381
Sauchelli, V.	577
Savage, A.	372, 699
Savastano, G.	214, 281, 283, 413, 565
Săvulescu, T.	20, 426, 549
Schaede, R.	649
Schaffnit, E.	158, 314, 502, 587
Schätzel, K.	81
Scheffer, T. C.	344, 411, 668
Scheibe, A.	359
Schick, R.	390
Schilberszky, K.	227, 575
Schilcher, E.	16
Schimmer, F.	644
Schliesing	295
Schlumberger, O.	589, 719
Schmidt, E.	152
Schmidt, E. W.	317, 416
Schmidt, P. W.	443
Schouten, A.	306
Schroeder, F. R.	221
Schultz, E. S.	388
Schuster, C. E.	601
Schwarz, O.	706

	PAGES
Scott, R. C.	619
Scott, R. M.	345
Seaver, F. J.	246
Seidler, F.	16
Sella, M.	485
Sempio, C.	734
Sendrail, M.	445
Sengbusch, R. v.	250, 477
Serrano, F. B.	521
Servazzi, O.	27
Serveille, J.	199
Servière, H.	138
Sevenster, A.	188
Severin, H. H. P.	446
Shahan, M. S.	692
Sharples, A.	506
Shaw, F. W.	444
Shear, C. L.	790
Shear, E. V.	453
Sheffield, F. M. L.	525, 526
Shen, C. I.	725
Shepherd, E. F. S.	115, 553
Sherbakoff, C. D.	11, 100, 762
Shrewsbury, J. F. D.	568
Sibilia, C.	244, 320, 875, 404
Siemaszko, W.	550
Silberschmidt, K.	313
Simmonds, J. H.	40, 200, 456
Simmonds, P. M.	501
Singh, G.	369
Sirag-el-Din, A.	174
Sirotina, M.	263
Skovholt, O.	757
Slate, G. L.	640
Sleeth, B.	418
Sluis, T. A. S.	724
Small, T.	110, 549
Smee, C.	332
Smith, F. E. V.	38, 90, 165
Smith, J. H.	540
Smith, K. M.	42, 59, 223, 541, 647, 776
Smith, N. J. G.	162
Smith, O.	654, 717
Smith, R. E.	180, 316
Smith, R. W.	17
Smith, W. K.	155, 156, 617
Smyth, H. F.	291
Snyder, W. C.	547, 609
Sokoloff, D. V.	260, 261
Sokolovskaya, R. E.	232
Solovieff, F. A.	406
Solunskaya, N.	571
Somazawa, K.	43, 598
Somers, L. A.	562
Spennemann	461
Sprague, R.	137, 279, 430
Staehelin, M.	450
Stahel, G.	435
Stakman, E. C.	427
Staner, P.	524
Stanley, A. R.	426
Stapp, C.	514, 600, 680, 742
Steiner, H.	681
Stephan, J.	531
Stevens, N. E.	121, 231, 249, 281, 452, 493, 679, 706
Stevenson, J. A.	385
Steyaert, R. L.	80, 91
Stiles, G. W.	692
Stimson, E.	669
Storck	460
Storey, H. H.	143, 537, 686, 748
Stoughton, R. H.	22
Stovall, W. D.	691
Stover, W. G.	402
Straib, W.	272, 273, 557
Straňák, F.	321
Stroede, W.	556
Suit, R. F.	453
Summers, E. M.	786
Sundararaman, S.	266
Sutherland, J. B.	104
Svolba, F.	575
Swanback, T. R.	477
Sweany, H. C.	173
Sydow, H.	395
Sylwester, E. P.	637
Szymański, W.	718
Tai, F. L.	247, 641, 661
Takahashi, W. N.	234, 401, 525
Takasu, B.	443
Takatsuki, S.	219
Takenouti, H.	564
Talice, R. V.	631
Tanaka, S.	768
Tapke, V. F.	161
Tascher, W. R.	644
Tasugi, H.	176, 623
Taubenhaus, J. J.	96, 291
Tedin, O.	670
Tehon, L. R.	601, 788
Templeton, H. J.	508
Teng, S. C.	395, 396, 724, 725
Tetley, U.	36
Thoenes, H.	279
Thom, C.	384
Thomas, J. A.	83
Thomas, H. E.	704, 766
Thomas, K. M.	719
Thomas, P. H.	36, 177
Thomas, R. C.	775
Thompson, A.	354
Thompson, E. I.	441
Thrupp, T. C.	644
Thung, T. H.	118
Thurston, H. W.	396
Tiddens, B. A.	513
Tiemann	359
Tikka, P. S.	478
Tilford, P. E.	26, 174, 643
Tiller, L. W.	35, 179, 573
Timonin, M.	534
Tims, E. C.	456
Tini, G.	542
Tisdale, W. B.	494
Todd, R. L.	324
Toenjes, W.	451
Togashi, K.	603
Tomkins, R. G.	34, 46
Tornow, E.	305
Toro, R. A.	246
Touze, A.	139
Towey, J. W.	173
Toxopeus, H. J.	212
Tranzschel, V.	631
Tranzschel, W. A.	515, 536
Trappmann, W.	577

PAGES

Triquart, J. 640
Troup, R. S. 734
Trout, S. A. 34
Truscott, J. H. L. . . . 749
Tubeuf, C. v. . . 66, 663, 737
Tucker, C. M. 594
Tufts, W. P. 103
Tullis, E. C. . . . 392, 655
Turner, H. A. 32
Turner, W. F. 703

Uchimura, K. 603
Ukkelberg, H. G. . . 427, 498
Unamuno, L. M. 330, 395, 469, 788
Uppal, B. N. . 393, 432, 551, 611

Valleau, W. D. . 117, 454, 471, 473
Van Beyma Thoe Kingma, F. H. 634, 662
Vandendries, R. 186
Van der Meer, J. H. H. . . 318
Van der Plank, J. E. . . . 759
Vanderwalle, R. 280
Van Hall, C. J. J. 207
Vanine, I. 251, 257, 259, 260, 261
Van Ness, R. A. 70
Van Poeteren, N. . . 304, 541
Van Roechoudt, L. L. . . . 760
Van Vloten, H. 63
Velthorst, H. 523
Veresciaghin, B. V. . . . 486
Vermillion, M. T. 402
Verona, O. 98, 616
Verplancke, G. 585
Verwoerd, L. 192
Viala, P. 265
Vidal, J. L. 745
Viennot-Bourgin, G. . . 276, 537
Vilkaitis, V. 492
Villedieu, G. 352
Vinson, C. G. 332
Vivoli, D. 629
Vladimirskaya, N. N. 259, 260, 261
Voelkel, H. . . 149, 266, 577
Voglino, P. . 62, 63, 181, 338, 373
Volkart, A. 783
Volkonsky, M. 580
Vondrák, J. 193
Voorhees, R. K. . . . 366, 564
Voss 74
Vukolov, V. 294

Wade, B. L. 741
Wager, V. A. 175
Waksman, S. A. 137
Walker, H. G. 633
Walker, J. C. 412, 413, 608, 609, 672
Wallace, G. B. . . . 201, 552
Wallace, T. 295
Walters, E. A. 689
Wampler, F. J. 444
Wang, D. T. 210
Ward, R. W. 35
Wardlaw, C. W. 104, 121, 382, 773, 794
Ware, W. M. 100, 101, 112, 242, 353, 611
Waterman, A. M. 408
Waters, H. A. 195

PAGES

Watts, J. W. 94
Watzl, O. 135
Weber, G. F. 60, 112, 546, 594, 765
Wedgworth, H. H. . . . 495
Weese, J. 667
Wehlburg, C. 483
Wehmeyer, L. E. . . . 595
Wei, C. T. 661
Weidenhagen, R. . . . 386
Weidman, F. D. . . . 370
Weigand, K. 721
Weimer, J. L. 177
Weindling, R. 192
Welch, D. S. 404
Wellman, F. L. . . . 133, 136
Welsh, J. N. . . . 211, 280
Werner, O. 681
Wertheim, H. 443
Wester, R. E. . . 216, 439, 628
Westerdijk, J. 478
Weston, W. H. 766
Wheeler, E. J. 654
Whetzel, H. H. 292
White, R. P. . . 291, 449, 696
Whitehead, T. 236
Whitney, W. A. 671
Wieder, L. M. 569
Wiertelak, J. 739
Wiesmann, R. 178
Wilbrink, G. 593
Wilcoxon, F. . . . 106, 710
Wiles, D. R. D. 788
Wilhelm 630
Wille, F. 314
Williams, P. H. 698
Willis, R. L. 708
Wilson, E. E. . . . 455, 458
Wilson, J. D. . 107, 459, 643, 657
Wilson, S. J. 370
Wingard, S. A. 415
Winkelmann, A. 175, 430, 642, 755
Wolf, F. T. 793
Wolff, H. 649
Wollenweber, H. W. . . 66, 257
Wood, J. I. . . . 493, 679
Wood, J. B. 740
Woods, M. W. 473
Woodward, R. C. 263
Wooley, J. C. 1
Wormald, H. . 26, 99, 103, 227, 487

Yamamoto, W. . . . 331, 605
Yamauti, K. 606
Young, P. A. 429
Young, W. J. . . . 40, 215
Yu, T. F. 363

Zade, A. 209, 481
Zaleski, K. 741
Zattler, F. 721
Zaumeyer, W. J. . 1, 414, 741
Zeisler, E. P. 288
Zelle, M. A. 570
Ziebarth, F. 478
Ziese, W. 148
Ziling, M. K. . . . 160, 191
Zschokke, A. 459

GENERAL INDEX

A virus of potato, 587, 648, 717.
AB–1 apparatus for seed disinfection, 617.
AB dust, composition of, 559, 617.
— —, use of, against cereal smuts, 617; against wheat bunt, 559.
Abaca, see *Musa textilis*.
Abavit 26, use of, against wheat bunt in the Argentine, 683.
— B, composition of, 305.
— —, determination of mercury in, 305.
— —, non-injurious action of, on seed-grain at normal temperatures, 279.
— —, use of, against *Bact. malvacearum* on cotton, 91; against *Calonectria graminicola* on rye and other cereals, 279; against *Ustilago avenae* on oats, 211, 279; against *U. kolleri* on oats, 211; against wheat bunt, 279.
— -Beiztrommel seed dusting apparatus, 501.
— dust, estimation of mercury on seed-grain treated with, 152.
— —, use of, against *Gibberella saubinetii* and *Helminthosporium sativum* on wheat, 683.
Abies, *Pestalozzia tumefaciens* on, in Belgium, 677.
— *alba*, see *A. pectinata*.
— *balsamea*, *Bifusella faullii* on, in Canada, 255.
— —, *Calyptospora columnaris* can infect, 613.
— —, *Hypodermella nervata* on, in Canada, 255.
— *cephalonica*, *Rehmiellopsis bohemica* on, in Scotland, 408.
— *concolor*, *Rehmiellopsis bohemica* on, in U.S.A., 408, 734.
— *nobilis*, *Armillaria mellea* on, in Scotland, 131.
— —, *Rehmiellopsis bohemica* on, in Scotland, 408.
— *pectinata*, *Armillaria mellea* on, in Germany, 480.
— —, die-back of, in Germany, 480.
— —, *Melampsora abieti-caprearum* on, in Poland, 550.
— —, *Rehmiellopsis bohemica* on, in Czecho-Slovakia, 408.
— *pindrow* and *A. pinsapo*, *Rehmiellopsis bohemica* on, in Scotland, 408.
— *sibirica*, *Calyptospora goeppertiana*, *Fomes robustus* f. *pinuum*, and *Melampsorella cerastii* on, in Russia, 666.
Abutilon, fungi on, in Russia, 631.
— *avicennae*, *Ascochyta abutilonis*, *Coniothyrium abutilonis*, *Leptosphaeria abutilonis*, and *Microdiplodia abutilonis* on, in Russia, 632.
— *mulleri* and *A. thompsoni*, virus causing variegation of, in U.S.A., 375.
Acacia, *Rhizoctonia lamellifera* on, in Kenya, 727.
[*Acacia*] *decurrens*, *Rosellinia* on, in Java, 425.
Acer, *Coniosporium corticale* on, in U.S.A., 174.
— *campestre*, *Verticillium* on, in Italy, 337.
— —, — *albo-atrum* on, in Italy, 734.
— *negundo*, *Verticillium albo-atrum* on, in Germany, 117.
— *platanoides*, *Verticillium* on, in Italy, 338.
— *rubrum*, *Nectria* on, in U.S.A., 404.
— *saccharum*, *Gloeodes pomigena* on, in U.S.A., 298.
— *spicatum*, *Nectria* on, in U.S.A., 404.
Acetaldehyde, effect of, on fungal decay of stored fruit in England, 34; on growth of *Trichoderma lignorum*, 46.
— in relation to storage spots of citrus, 565.
Acetates in relation to brown stain of citrus, 566.
Acetic acid in relation to storage spots of citrus, 565.
— —, toxicity of, to *Coniophora cerebella*, 261; to *Merulius lacrymans*, 261; to *Sclerotinia americana*, 229; to *S. cinerea* and *Trichothecium roseum*, 523.
— —, use of, as a soil disinfectant, 11, 42, 268.
Acetone, effect of, on growth of *Trichoderma lignorum*, 46.
—, use of, in hot-water treatment of wheat against *Ustilago tritici*, 500.
Achlya gracilipes in soil in Austria, 191.
Achorion, toxicity of dyes to, 371.
— *quinckeanum* on man in Australia, 444; in Denmark, 95.
— — on mice in Australia and U.S.A., 444.
— *schoenleini*, cultivation of, 448.
— —, hydrogen-ion relations of, 569.
— — on man, diagnosis of, by fluorescence of hairs, 23, 218; effect of grenz rays on, 694; of short-wave irradiation on, 443; notes on, 178; occurrence in Algeria, 510; in Germany, 444; in U.S.A., 694; vaccination against, 694.
— —, toxicity of dyes to, 371.
Acladium in soil in Austria, 191.
Acremonium on man in Hungary, 289; in U.S.A., 290.
— *keio* on man in Japan, 219.
Acrostalagmus in soil in China, 656.
— on beet in Czecho-Slovakia, 348.
— on pulpwood in U.S.A., 545.
— *cephalosporioides*, artificial immunization of plants against, 779.
Acrothecium capsici on chilli in Porto Rico, 246.
— *robustum* in soil in China, 656.
Actinomyces in soil in Austria, 191.
— on alder in Germany, 312, 649.

[*Actinomyces*] on *Hippophaë rhamnoides* in Germany, 649.
— on potato, see *A. scabies*.
— on strawberry in U.S.A., 268.
— *cacaoi* on cacao from Nigeria, 149, 207.
— *clavifer* and *A. flavus* on potato in Italy, 783.
— *scabies* on potato, control, 189, 239, 320, 321, 389, 462, 589, 651, 652, 785; factors affecting, 189, 320, 389, 651, 652, 717, 783, 785; legislation against, in Portugal, 127; note on, 652; occurrence in Canada, 462; in Denmark, 715; in Germany, 239, 266, 321, 589, 651, 653; in Italy, 320, 783; in Norway, 189; in Portugal, 127; in U.S.A., 389, 651, 652, 717; studies on, 462, 783; varietal susceptibility to, 189, 266, 320, 321, 589, 716.
Actinomycetes, antagonism of, to *Pythium arrhenomanes*, 679.
— in soil, decomposition of plant materials by, 393; effect of rape cake on numbers of, 593.
Adhesiveness of copper sprays, estimation of, 189.
Aecidium mori on mulberry in China, 396.
— *punctatum* on *Hepatica acutiloba* in U.S.A., 388.
— *tubulosum* on *Solanum incanum* in Sierra Leone, 553.
Aegilops, *Puccinia triticina* can infect, 274.
— *cylindrica*, *Puccinia lolii* can infect, 274.
Aesculus californica and *A. flava*, *Guignardia aesculi* on, in U.S.A., 251.
— *hippocastanum*, see Horse-chestnut.
Agave americana, *Microdiplodia agaves* and *Pleospora bataanensis* on, in India, 395.
— *rigida* var. *sisalana*, see Sisal.
Ageratum, *Rhodochytrium spilanthidis* on, 397.
Agfa, estimation of mercury in, 305.
Agglutination, see Serological studies.
Agral I as an emulsifier of glyceride oils, 576.
— — as a spreader, 403, 744.
— N as a spreader, 744.
Agrals as spreaders, 305.
Agropyron, *Puccinia triticina* can infect, 274.
— *elongatum*, *Gibberella saubinetii* can infect, 622.
— *repens*, *Colletotrichum* on, in Canada, 621.
— —, *Erysiphe graminis* on, resistance to, 362.
— —, *Fusarium* on, in Canada, 621.
— —, *Gibberella saubinetii* can infect, 622.
— —, *Helminthosporium sativum* on, in Canada, 621.
— —, *Lagena radicicola* on, in Canada, 749.
— —, *Ophiobolus graminis* on, in Canada, 621.
— —, *Puccinia glumarum* can infect, 273.
— —, — *graminis* can infect, 274.
— *richardsonii*, *Helminthosporium sativum* on, in Canada, 621.
[*Agropyron*] *smithii*, *Puccinia graminis* on, in U.S.A., 556.
— *tenerum*, *Fusarium* on, in Canada, 621.
— —, (?) *Leptosphaeria*, *Helminthosporium sativum*, and *Ophiobolus graminis* on, in Canada, 621.
Agrostis, *Helminthosporium* on, in U.S.A., 356.
—, *Puccinia graminis* on, hybridization of, with *P. g. tritici*, 208.
— *alba*, *Erysiphe graminis* on, resistance to, 362.
— —, *Hadrotrichum virescens* on, in Poland, 550.
— *stolonifera*, *Claviceps microcephala* in seed samples of, in Denmark, 294.
— —, *Olpidium agrostidis* on, in England, 223.
— —, *Pythium butleri* on, in U.S.A., 450.
Air, fungi in, of apple orchards in England, 32; in the upper, in U.S.A., 385.
Aithaloderma fici on *Ficus* in the Philippines, 115.
Albizzia falcata, *Rosellinia* on, in Java, 425.
— *lebbek*, *Sphaerophragmium acaciae* on, in China, 724; in Réunion, 680.
Albugo, see *Cystopus*.
Albumin as a wetting agent, 181.
Alcohol, toxicity of, to *Sclerotinia americana*, 229; to *Trichophyton mentagrophytes*, 509.
—, use of, in hot-water treatment of wheat against *Ustilago tritici*, 500.
Alder (*Alnus*), *Actinomyces* on, in Germany, 312, 649.
—, *Ceratostomella ulmi* can infect, 665.
—, root nodules of, in Germany, 312, 649.
Aleurites fordii, *Bacterium aleuritidis* on, in U.S.A., 130.
— —, (?) *Marasmius* on, in Queensland, 201.
Aleurodiscus oakesii on *Carpinus caroliniana*, elm, hickory, oak, *Ostrya virginiana*, and *Salix* in U.S.A., 601.
Aleyrodidae as vectors of tobacco leaf curl in the Belgian Congo, 143; in S. Africa, 791; in S. Rhodesia, 58.
—, control of, on citrus by *Aschersonia aleyrodis* in U.S.A., 568.
'Alfa' soil sterilization apparatus, 460.
Alfalfa, see Lucerne.
Algae, parasitism of various phytopathogenic fungi to, 307.
Allantophoma endogenospora, *A. exogenospora*, and *A. nematospora* on *Pseudotsuga taxifolia* in Germany, 789.
Allium ascalonicum, see Shallot.
— *cepa*, see Onion.
— *fistulosum*, *Peronospora schleideni* on, in U.S.A., 416.
— —, *Phoma terrestris* on, in U.S.A., 416, 547.
— —, *Urocystis cepulae* on, in U.S.A., 416.
— *porrum*, see Leeks.
— *sativum*, see Garlic.
— *schoenoprasum*, *Peronospora schleideni* can infect, 484.

[*Allium schoenoprasum*], resistance of, to *Phoma terrestris*, in U.S.A., 547.
Almond (*Prunus amygdalus*), *Fusarium oxysporum* on, in Greece, 469.
—, *Gloeosporium amygdalinum* on, in S. Africa, 380.
—, *Verticillium dahliae* can infect, 76.
Alnus, see Alder.
Alpha-terpineol, toxicity of, to *Sporotrichum schenckii* and *Trichophyton granulosum*, 291.
Alpine plants, fungi on the stigmas of, in Italy, 449.
Alsike, see Clover.
Alternaria believed to be a stage of *Phialophora verrucosa*, 370.
— can infect apple, 423.
— in air of apple orchards in England, 32.
— in soil in Siberia, 191; in U.S.A., 71; relation of, to *Fusarium orthoceras* var. *pisi* on peas, 71.
— on banana, 39.
— on chicory in Cyprus, 747.
— on chilli in Spain, 354.
— on citrus in Cyprus, 747.
— on cumin in India, 551.
— on elm in U.S.A., 124, 125.
— on flax from Austria, Canada, Holland, Russia, and U.S.A., 220.
— on fruit trees in Italy, 640.
— on pulpwood in U.S.A., 545.
— *bokurai* on *Pyrus* (?) *serotina* in Manchuria, 769.
— *brassicae* on cabbage in Italy, 200.
— — on cauliflower, influence of narcosis on susceptibility to, 45.
— — on crucifers in U.S.A., 546.
— — on melon in Italy, 200.
— *circinans* on crucifers in U.S.A., 546.
— *citri* on orange in Australia, 215.
— *humicola* in soil in China, 656.
— *kikuchiana* on *Pyrus serotina* in Japan, 768.
— *longipes* on tobacco, formerly referred to *A. tabacina*, 748; notes on, 476; occurrence in Rhodesia, 476, 748, 794.
— *oryzae* on rice in Japan, 533.
— *panax* on ginseng in U.S.A., 657.
— *radicina* on carrot in Holland, 72.
— *solani*, effect of calcium caseinate, fish oil, and sodium oleate on germination of, 268.
— — on potato, control, 495, 654; occurrence in India, 76; in U.S.A., 495, 654; varietal susceptibility to, 76.
— — on tomato, notes on, 267, 495, 678; occurrence in Canada, 678: in Trinidad, 121; in U.S.A., 249, 267, 495.
— *tabacina* on tobacco in Rhodesia now referred to *A. longipes* Tisdale and Wadkins, 748.
— *tenuis* on alpine plants in Italy, 449.
— — on wheat in Siberia, 160.
— *tomato* on tomato in Germany, 662; in U.S.A., 121.
— *vitis* on vine in Rumania, 486.
Althaea, see Hollyhock.
Alum as an adhesive, 286, 420.
—, use of, against *Plasmopara viticola* on vine, 189, 199.
Aluminium sulphate, use of, against damping-off of conifers, 269.
— — -lime sulphur, effect of, on flavour and sugar-content of apples, 35.
Amanita muscaria on pine forming mycorrhiza, 778.
Amaranthus retroflexus, *Plenodomus meliloti* on, in Canada, 636.
Amblyosporium echinulatum in soil in China, 656.
Ambrosia, *Rhodochytrium spilanthidis* on, 397.
Amelanchier alnifolia, *Gloeosporium perennans* on, in U.S.A., 299.
— —, *Neofabraea malicorticis* can infect, 299.
Amines as toxic agents of *Didymella lycopersici*, 315; of *Fusarium lycopersici*, 387; of *F. vasinfectum*, 315, 387.
Ammonia, effect of, on growth of *Trichoderma lignorum*, 47.
—, use of, against *Penicillium digitatum* on citrus, 84; in timber preservation, 411.
Ammonium bicarbonate, use of, against *Penicillium digitatum* on citrus, 84.
— chloride, toxicity of, to mould of mildewed wool, 25.
— polysulphide + nicotine soap, use of, against *Diplocarpon rosae* on rose, 223.
— thiocyanate, use of, against *Thielaviopsis basicola* on tobacco, 493.
Amoeba verrucosa, fungi capturing and killing, in U.S.A., 761.
Amoebosporus saccharinum and *A. vascularum* on sugar-cane in Porto Rico, 467; *Ligniera vascularum* synonym of both, 467.
Amphorophora rubi, *A. rubicola*, and *A. sensoriata*, transmission of raspberry mosaic by, in U.S.A., 771.
Amygdalus communis, see Almond.
— *persica*, see Peach.
Amyl formate, effect of, on growth of *Trichoderma lignorum*, 46.
Ananas sativus, see Pineapple.
Andromeda glaucophylla, uredo on, in U.S.A., 67.
Andropogon sorghum, see Sorghum.
Anemone coronaria, beet curly top virus can infect, 447.
— *ranunculoides*, *Puccinia pruni-spinosae* on, in Switzerland, 718.
Aniline, discoloration of Russian timber by, 257.
—, toxicity of, to *Sclerotinia americana*, 229.
— dyes, see Dyes, aniline.
Antestia lineaticollis in relation to *Nematospora coryli* on coffee in Kenya, 8.
Anthostomella on elm in U.S.A., 125.
Anthracene oil, see Oil, anthracene.
'Anthracnose', use of the term, 596.
Antirrhinum, *Diplodina antirrhinicola* on, in Portugal, 726.
— *majus*, *Puccinia antirrhini* on, in Great Britain, 764.
— —, *Sclerotinia sclerotiorum* on, in U.S.A., 291.
— —, *Verticillium dahliae* can infect, 470.

Anulosporium nematogenum on *Aphelenchus*, *Cephalobus*, *Dorylaimus*, fly larvae, and *Rhabditis* in U.S.A., 762.
Anuraphis tulipae transmitting tulip breaking in England, 633.
Aphanomyces euteiches on peas, control, 413, 609; factors affecting, 413; occurrence in France, 489; in U.S.A., 413, 609; regarded as secondary to bacteria, 413; varietal susceptibility to, 413.
— *levis* on beet in Austria, 135; in Czecho-Slovakia, 546.
— *raphani* on radish in Germany, 350; in U.S.A., 546.
Aphelenchus, *Anulosporium nematogenum* on, in U.S.A., 762.
Aphis gossypii, transmission of bean mosaic by, in U.S.A., 414; of celery mosaic by, in U.S.A., 136.
— *laburni*, *Empusa fresenii* on, in Sierra Leone, 553.
— *maydis* transmitting streak disease of *Coix lacryma jobi* to sugar-cane and of maize to maize in Réunion, 328.
— *rubiphila* (?) transmitting raspberry mosaic in U.S.A., 771.
— *rumicis* transmitting bean mosaic in U.S.A., 414.
Apioporthe, British species of, 595.
Apium graveolens, see Celery.
Aplanobacter insidiosum on clover in Russia, 571.
— — on lucerne, nature of resistance to, 221; notes on, 571: occurrence in Canada, 636; in Russia, 571; in U.S.A., 177, 221, 615; study on, 221; varietal resistance to, 222, 572, 615, 636.
— — on *Onobrychis viciaefolia* in Russia, 571.
— *michiganense* on tomato, control, 267, 663; occurrence in Germany, 662; in U.S.A., 249, 267, 424; overwintering of, 424; symptoms of, 663; variation in, 81.
— *rathayi*, see *Bacterium rathayi*.
— *stewarti* on maize, breeding against, 206; control, 563, 688; effect of, on susceptibility to *Diplodia zeae*, 364; factors affecting, 688; notes on, 78, 281, 687; occurrence in Canada, 551; in Russia, 165; in U.S.A., 78, 206, 281, 364, 562, 679, 687, 688; overwintering of, 688; strains of, 364; studies on, 364, 562, 688; transmission of, by *Chaetocnema denticulata* and *C. pulicaria*, 688; by *Diabrotica longicornis*, 364; by seed, 688; varietal resistance to, 78, 364, 563, 687, 688.
Apocynum, *A. androsaemifolium*, and *A. cannabinum*, fungi on, in Russia, 631.
— *venetum*, *Melampsora apocyni* on, in Central Asia and Russia, 515.
— —, *Septoria apocyni* on, in Russia, 631.
'Apoplexy' of apricot and cherry in Hungary, 227.
— of stone fruits in Hungary, 227, 575.
Aposphaeria zeae on maize in the Caucasus, 505.
Apparatus for detecting mercury in treated seed-grain, 152.
—, see also Dusting, Seed disinfection, and Spraying apparatus.
Apple (*Pyrus malus*), *Alternaria* can infect, 423.
—, *Aspergillus* on, in U.S.A., 517.
—, — *sclerotiorum* on, in U.S.A., 518.
—, *Bacillus amylovorus* on, control, 100, 225, 452, 701, 766; dissemination of, 700; by bees and other insects, 701; factors affecting, 700; legislation against, in Bulgaria, 592; note on, 455; occurrence in Canada, 452; in Italy, 200; in U.S.A., 100, 225, 455, 700, 766; overwintering of, 700; studies on, 700, 766.
—, bacterial disease of, in U.S.A., 13.
—, *Bacterium tumefaciens* on, in U.S.A., 637.
—, bitter pit of, control, 103; etiology of, 103; factors affecting, 103, 142, 573; occurrence in New Zealand, 573; in S. Africa, 142; in U.S.A., 100, 103.
—, *Botrytis* on, in Switzerland, 8.
—, — *cinerea* on, specialization of parasitism of, 184.
—, *Cladosporium* on, in England, 32.
—, *Clasterosporium* on, in U.S.A., 378. (See also measles of.)
—, 'cork' spot of, in U.S.A., 769.
—, *Cytosporina ludibunda* on, factors affecting, 32, 378; pycnidial formation in, 782; saltation in, 377; virulence of, 377, 573.
—, deep scald of, in New Zealand, 574.
—, *Diaporthe* spp. on, virulence of, 573.
—, — *perniciosa* on, factors affecting, 33; occurrence (?) in U.S.A., 226; perfect stage of *Phomopsis mali*, 226; virulence of, 573.
— diseases, spray warnings against, in Ontario, 295; in Quebec, 296; in U.S.A., 102.
—, 'drought' spot of, in U.S.A., 769.
—, *Fusarium* on, in England, 353.
—, — *coeruleum* can infect, 184.
—, — *fructigenum* on, see *F. lateritium* var. *fructigenum*.
—, — *lateritium* var. *fructigenum* on, factors affecting, 32, 184; specialization of, 99, 184.
—, *Gloeodes pomigena* on, control, 517; host range of, 206, 299; occurrence in England, 488; in France, 517; in U.S.A., 298; study on, 299; varietal susceptibility to, 517.
—, *Gloeosporium* on, in Switzerland, 8.
—, — *perennans* on, control, 702; *Eriosoma lanigera* in relation to, 701; factors affecting, 453, 701; occurrence in Canada, 701; in New Zealand, 179; in U.S.A., 453; studies on, 179, 701; varietal susceptibility to, 179, 702.
—, *Glomerella cingulata* on, control, 100, 709; occurrence in Ceylon, 77; in U.S.A., 100, 709.
—, *Gymnosporangium germinale* on, factors affecting, 100, 704; incubation period of, 704; notes on, 452; occurrence

in U.S.A., 100, 423, 452; pathogenicity of, 100; varietal susceptibility to, 423, 452.
[Apple, *Gymnosporangium*] *globosum* on, in U.S.A., 100, 423.
—, — *juniperi-virginianae* on, factors affecting, 100; occurrence in U.S.A., 100, 423, 452; pathogenicity of, 100; varietal susceptibility to, 423, 452; viability of, 100.
—, — *yamadae* on, in China, 396.
—, *Helicobasidium purpureum* on, in England, 353.
—, infectious variegation of, in U.S.A., 636.
—, internal breakdown of, in New Zealand, 35, 573.
—, — cork of, in Tasmania, 36.
—, Jonathan spot of, in New Zealand, 574.
—, little leaf of, in U.S.A., 99, 205.
— measles, fungus causing, said to belong to the Sphaeropsidales, 749; losses caused by, 12; notes on, 378, 749; occurrence in U.S.A., 12, 378, 423, 749; types of, 378, 423; varietal resistance to, 12, 749.
—, *Mycosphaerella pomi* on, in Queensland, 201; in U.S.A., 423.
—, *Nectria galligena* on, in England, 353.
—, *Nummularia discreta* on, in U.S.A., 100.
—, *Penicillium* on, effect of, on carbon dioxide production by, 34; occurrence in Switzerland, 8; in U.S.A., 295; sources of contamination by, 295; varietal susceptibility to, 423.
—, — *crustaceum* on, in Spain, 377.
—, — *expansum* on, control, 226, 574, 703; factors affecting, 226; occurrence in New S. Wales, 703; in U.S.A., 226, 295, 574; sources of contamination by, 226, 295; study on, 226.
—, *Phomopsis* on, biochemical notes on, 32; virulence of species of, 573.
—, photochemical spotting of, in England on New Zealand fruit, 179.
—, *Phyllosticta mali* on, in Spain, 330.
—, — *solitaria* on, control, 100, 572; factors affecting, 701; occurrence in U.S.A., 100, 572, 701; sporulation of, 701; study on, 701.
—, *Physalospora cydoniae* on, control, 100; occurrence in Belgium, 8; in Rumania, 550; in U.S.A., 100.
—, physiological spotting of, in Canada, 453.
—, *Podosphaera leucotricha* on, control, 128, 140, 297; factors affecting, 140, 298, 517; nature of resistance to, 517; occurrence in England, 140, 297; in Germany, 123, 298, 517, 746; in Hungary, 517; stock influence on susceptibility to, 298; varietal susceptibility to, 298.
—, — (?) *oxyacanthae* on, in Tasmania, 28.
—, *Pseudomonas syringae* on, in U.S.A., 376; synonymy of, 376.
—, rosette of, see little leaf of.
[Apple] scald in New S. Wales, 703; in U.S.A., 423. (See also deep, soft, and spot scald of.)
—, *Sclerotinia cinerea* on, control, 99; factors affecting, 99; occurrence in England, 99, 353, 488; varietal susceptibility to, 353, 488.
—, — *fructigena* on, control, 103, 766; factors affecting, 702; notes on, 103, 179; occurrence in Austria, 702; in England, 103, 766; study on, 702; varietal resistance to, 702.
—, *Sclerotium rolfsii* on, in New S. Wales, 377.
—, soft scald of, in U.S.A., 103.
—, spore load on, in the orchard, packing house, and boxes in U.S.A., 295.
—, spot scald of, in Canada, 299.
—, *Stereum purpureum* on, in S. Australia, 142.
—, *Trichothecium roseum* on, in England, 32.
—, *Venturia inaequalis* on, ascospore discharge of, 32, 225, 296, 612, 746; control, 8, 12, 28, 31, 100, 101, 102, 204, 225, 268, 296, 297, 376, 450, 451, 452, 487, 572, 612, 613, 614, 637, 678, 709, 766, 774; development of, in storage, 8, 32, 376; dissemination of, 179; factors affecting, 31, 178, 225, 746; 'Geneva system' of evaluating treatments against, 638; germination of, 268; notes on, 766; occurrence in Canada, 296, 678; in England, 100, 101, 297, 452, 487, 766, 774; in Germany, 31, 297, 377, 746, 766; in New Zealand, 296; in Switzerland, 8, 178, 377, 450; in Tasmania, 28, 32; in U.S.A., 12, 28, 30, 100, 102, 204, 225, 451, 572, 612, 613, 614, 637, 709; pinhead form of, 678; spray warnings against, in Canada, 296; in U.S.A., 102; stock influence on susceptibility to, 298; studies on, 178, 296, 637; varietal resistance to, 225; viability of, 179.
—, virus disease of, in U.S.A., 455.
—, wound callus knots of, in U.S.A., 687.
—, *Xylaria polymorpha* on, in U.S.A., 100.
—, yellow leaf of, in U.S.A., attributed to spray injury, 29.
— orchards, *Alternaria*, *Botrytis*, *Cladosporium*, *Epicoccum*, *Fusarium*, *Fusicladium*, *Pleospora*, *Polyopeus*, and *Sporotrichum* in air of, in England, 32.
Apricot (*Prunus armeniaca*), 'apoplexy' of, in Hungary, 227.
—, *Clasterosporium carpophilum* on, in France, 301.
—, *Fusarium oxysporum* on, in Greece, 469.
—, *Gloeosporium perennans* can infect, 299.
— gummosis, control, 180; notes on, 181; occurrence in Egypt, 749; in Germany, 180; in Italy, 639.
—, little leaf of, in U.S.A., 99.
—, *Neofabraea malicorticis* can infect, 299.

[Apricot], *Sclerotinia americana* on, in Victoria, 703.
—, — *cinerea* on, control, 301, 302, 451; factors affecting, 302; note on, 703; occurrence in Austria, 703; in France, 301, 302; in Switzerland, 451; varietal resistance to, 302.
—, *Stereum purpureum* on, in S. Australia, 142.
—, *Verticillium* on, in Italy, 338.
—, — *dahliae* on, in France, 76.
Arachis hypogaea, see Groundnut.
Araucaria imbricata, *Cryptosporella araucariae* on, in Italy, 63; perfect stage of *Fusicoccum araucariae*, 63.
Arbutus unedo, *Sphaceloma mattirolianum* on, in Germany, 661; in Italy 661; synonymy of, 661.
Areca palm (*Areca catechu*), *Phytophthora arecae* on, in India, 76.
— —, *Polyporus ostreiformis* on, in India 551.
Arisaema triphyllum, *Uromyces caladii* on, in U.S.A., 388.
Aristastoma concentrica on cowpea in U.S.A., 788.
Aristolochia bracteata, *Colletotrichum* on, in India 37.
Armillaria mellea, decomposition of wood by, 343.
— — on *Abies nobilis* in Scotland, 131.
— — on *Abies pectinata* in Germany, 480.
— — on banana in Tanganyika, 552.
— — on cacao, 207.
— — on carrot in S. Australia, 142.
— — on cassava in Tanganyika, 552.
— — on *Cedrela odorata* and *C. toona* in S. Africa, 142.
— — on cherry in England, 343.
— — on coffee in the Belgian Congo, 760; in Tanganyika, 201; in Uganda, 422.
— — on conifers in Germany, 739.
— — on *Eucalyptus paniculata* in S. Africa, 142.
— — on *Grevillea robusta* in S. Africa, 142; in Tanganyika, 201.
— — on *Juniperus procera* in S. Africa, 142.
— — on lemon in Nyasaland, 10.
— — on orange in S. Australia, 142; in Tunis, 302.
— — on *Parinarium mobola* in S. Africa, 142.
— — on parsnip in S. Australia, 142.
— — on pine, control, 131, 799; fires in relation to, 799; occurrence in France, 799; in Scotland, 130; in S. Africa, 142; in Switzerland, 195; studies on, 130, 195.
— — on *Rhododendron* in U.S.A., 696.
— — on spruce in Scotland, 130.
— — on sugar-cane in Tanganyika, 552.
— — on tea in Nyasaland, 10.
— — on timber, action of, 343.
— —, spread of, from permanent foci in France, 578.
Arrhenatherum elatius, *Puccinia lolii* can infect, 274.
[*Arrhenatherum elatius*], resistance of, to *Erysiphe graminis*, 362.
— —, *Ustilago decipiens* on, in Germany, 650.
— —, — *perennans* in seed samples of, in Denmark, 294.
Arsenic, a constituent of uspulun-universal, 305.
—, estimation of, in treated timber, 133.
— compounds, use of, as timber preservatives, 385; as fungicides, 494.
— —, volatile, formation of, by moulds, 384, 713.
Arthrobotrys oligospora and related species on nematodes in U.S.A., 512.
Artichoke (*Cynara scolymus*), *Oidium cynarae* on, in Italy, 660.
Artificial silk, *Aspergillus niger*, bacteria, *Mucor*, *Penicillium*, and *P. brevicaule* on, in England, 446.
Artocarpus integrifolia, *Phytophthora* on, in India, 76.
— —, *Rhizopus artocarpi* on, in Réunion, 680.
Arum lily, see *Zantedeschia aethiopica*.
Aschersonia aleyrodis, control of whiteflies on citrus by, in U.S.A., 568.
— *marginata*, see *Hypocrella reineckiana*.
Asclepias, fungi on species of, in Russia, 651.
—, *Rhodochytrium spilanthidis* on, 397.
Ascochyta on coffee in Eritrea, 746.
— on *Phaseolus* in Uganda, 422.
— on *Vigna* in Uganda, 422.
— *abutilonis* on *Abutilon avicennae* in Russia, 632.
— *buxina* on box in Portugal, 726.
— *citricola* on orange in Portugal, 726.
— *cycadina* on *Cycas revoluta* in India, 395.
— *eriobotryae* on loquat in China, 396.
— *fragariae* pycnidial stage of *Mycosphaerella fragariae*, 705.
(?) — *gossypii* on cotton in Queensland, 200.
— *graminicola*, antagonism of, to *Ophiobolus graminis*, 684.
— *hibisci-cannabini* on *Hibiscus cannabinus* in Russia, 632.
— *parasitica*, see *A. piniperda*.
— *phaseolorum* on bean in Sweden, 330; forms of, 330.
— *piniperda* on spruce in Germany and Sweden, 667.
— *pinodella* on peas in Holland, 483; in U.S.A., 609.
— *pisi* on peas in Germany, 740; in Holland, 483.
— *rabiei* on *Cicer arietinum*, factors affecting, 265; not accepted as a name for *Phyllosticta rabiei*, 137; note on, 75; occurrence in France, 75; in India, 264; in Rumania, 549; study on, 265.
— *zeina* on maize in the Caucasus, 505.
Ascospora longi on fruit trees in Italy, 640.
Ash (*Fraxinus*), *Gloeodes pomigena* on, in U.S.A., 206.

[Ash], *Nectria* on, in U.S.A., 404.
—, *Verticillium albo-atrum* on, in Holland, 665.
Asimina triloba, *Gloeodes pomigena* on, in U.S.A., 206.
Asparagus, *Phoma asparagi* on, in China, 395.
—, *Puccinia asparagi* on, legislation against, in Germany, 336 ; occurrence in Germany, 336, 745.
Aspergillaceae, a species of, on fowls in U.S.A., 270.
Aspergillus, availability of nitrogen in tissues of, to soil organisms, 533.
— in soil in China, 656 ; in Siberia, 191 ; in U.S.A., 56.
— in sulphur fungicides in U.S.A., 107.
— on apple in U.S.A., 517.
— on cacao, lipase production by, 47.
— on copra in Malaya, 355 ; lipase production by, 47.
— on man in S. America, 173 ; in relation to splenomegaly, 445.
(?) — on mushrooms in U.S.A., 352.
— on tobacco in U.S.A., 145.
—, taxonomic study on species of, 396.
— *awamori* in koji, 397.
— *cellulosae*, decomposition of rape cake by, 593.
— *fischeri*, production of arsenical gas by, 384.
— —, variation in, 529.
— *flavus*, lipase production by, 47
— — *-oryzae* on man in Uruguay, 631.
— *fumigatus*, agglutination of spores of, 445.
— — can infect the dog, 445.
— — in pulp and paper mill systems in U.S.A., 545.
— — on the fowl in Canada, 372.
— — on maize ensilage in Canada, 372.
— — on man in Holland, 289.
— —, production of arsenical gas by, 384 ; of lipase by, 47.
— *glaucus* on bread in Russia, 625.
— — on sugar causing inversion in Czecho-Slovakia, 193.
— —, production of volatile arsenic compounds by, 714.
— *gracilis* on cacao in England, 149.
— *hortai* can infect the dog, 445.
— *luchuensis*, differentiation of *A. awamori* from, 397.
— *montevidensis* on man in Uruguay, 631.
— *nantae* can infect the dog, 445.
— *niger*, agglutination of spores of, 445.
— —, artificial immunization of plants against, 779.
— —, effect of excretions of, on growth of wheat, 85.
— — in soil in U.S.A., 324.
— — on artificial silk in England, 446.
— — on bread in U.S.A., 757.
— — on lemon in Italy, 434.
— — on man in the Sudan, 371; in Uruguay, 631.
(?) — — on wool in U.S.A., 24.
— —, production of citric acid by, 434 ; of lipase by, 47.
[*Aspergillus*] *ochraceus*, production of arsenical gas by, 384 ; of lipase by, 47.
— *oryzae*, decomposition of rape cake by, 593.
— *repens* in soil in Czecho-Slovakia, 535.
— — on cacao in England, 149.
— *ruber* on cacao in England, 149.
— *sclerotiorum* on apple in U.S.A., 518.
— *sydowi* on cacao in England, 149.
— —, production of arsenical gas by, 384 ; of lipase by, 47.
— *tamarii*, lipase production by, 47.
— *terreus* on cacao in England, 149.
— *tunetana* can infect the dog, 445.
— *virens*, formation of volatile arsenic compounds by, 714.
— *wentii* on banana, 39.
Asphalt, use of, as a wound dressing, 354.
Asphaltic petroleum, use of, as a timber preservative, 70.
Aspidium aristatum, *Taphrina cornu-cervi* on, 664.
Aster, China (*Callistephus chinensis*), *Botrytis* on, in U.S.A., 448.
—, —, *Corticium solani* on, in S. Africa, 175.
—, —, *Fusarium* on, in Greece, 470 ; in Japan, 448.
—, —, — *conglutinans* var. *callistephi* on, control, 374 ; occurrence in Italy, 373; in U.S.A., 79, 448; pathogenicity of, 448 ; study on, 373 ; varietal resistance to, 79, 374, 448.
—, —, — — var. *majus* on, in Europe, 448 ; in S. Africa, 175.
—, —, — *culmorum* and *F. dianthi* on, in Germany, 633.
—, —, — *lateritium* var. *fructigenum* on, in Europe, 448.
—, —, — *oxysporum* f. 6 on, in Europe, 448.
—, —, *Gibberella saubinetii* on, in Germany, 633.
—, —, *Phomopsis callistephi* on, in U.S.A., 448.
—, —, *Pythium ultimum* and *Sclerotium rolfsii* on, in S. Africa, 175.
—, —, tomato spotted wilt virus can infect, 59.
—, —, *Verticillium cinerescens* on, in Germany, 633.
—, —, yellows of, in U.S.A., 136 ; transmission of, by *Cicadula sexnotata*, 136, 446 ; types of, 136 ; virus of, affecting *Helichrysum bracteatum* and *Zinnia elegans* in U.S.A., 446.
Asterocystis radicis on flax in relation to 'soil sickness', 221.
Asterosporium hoffmanni, necrotic effect of, on phloem of beech, 44.
Atheta pseudocoriaria, transmission of *Phoma lingam* on swedes by, in New Zealand, 134.
Atomic sulphur, see Sulphur, atomic.
Aucuba mosaic of potato, identity of European and American forms of, 48 ; occurrence in Belgium, 585 ; in Poland, 716 ; relation of, to tobacco ring spot, 472.

[Aucuba mosaic] of tomato, artificial production of the intracellular bodies of, 526; effect of, on development of chloroplasts, 525; on physiology of the host, 731; multiplication of virus of, in plant tissues, 528; occurrence in England, 731; particulate nature of virus of, 528; transmission of, to *Nicotiana glutinosa*, 527; to *Solanum nodiflorum* and tobacco, 525.
Aulacaspis pentagona, *Pseudomicrocera henningsii* and *Sphaerostilbe coccidophthora* on, in the Seychelles, 144.
Aulographum ledi renamed *Elsinoe ledi*, 661.
Avena fatua, *Puccinia lolii* can infect, 274; occurrence on, in Canada, 364.
— spp., see Oats.
Avenarius carbolineum, use of, as a timber preservative, 1.
Avocado pear (*Persea gratissima*), *Botryodiplodia theobromae* on, in Brazil, 707.
— —, *Botrytis* on, in Sierra Leone, 553.
— —, *Cladosporium* on, in Brazil, 707.
— —, *Colletotrichum* on, in Sierra Leone, 553.
— —, *Diplodia natalensis* on, in Brazil, 707.
— —, — *tubericola* can infect, 366.
— —, *Dothiorella* on, in U.S.A., 79.
— —, *Fusarium*, *Glomerella cingulata*, *Hendersonia*, *Oidium*, and *Pestalozzia* on, in Brazil, 707.
— —, *Physalospora rhodina* and *P. zeicola* can infect, 366.
— —, *Pythium* on, in the Philippines, 383.
— —, *Sphaceloma* on, in Brazil, 707.
Axyris amaranthoides, *Plenodomus meliloti* on, in Canada, 636.
Azalea, see Rhododendron.

Bacillus amylovorus on apple, control, 100, 225, 452, 701, 766; dissemination of, 700; by insects, 701; factors affecting, 700; legislation against, in Bulgaria, 592; note on, 455; occurrence in Canada, 452; in Italy, 200; in U.S.A., 100, 225, 455, 700, 766; overwintering of, 700; studies on, 700, 766.
— — on *Crataegus* in Canada, 452.
— — on *Crataegus oxyacantha* and *C. punctata* in U.S.A., 766.
— — on fruit trees, legislation against, in S. Rhodesia, 463.
— — on pear, control, 13, 357, 701, 766; dissemination of, 700; by insects, 13, 701; factors affecting, 700; legislation against, in Bulgaria, 592; occurrence in Canada, 452; in Italy, 200; in U.S.A., 11, 12, 357, 700, 766; overwintering of, 12, 700; studies on, 700, 766; varietal resistance to, 11.
— — on *Pyrus* (?) *americana* in Canada, 452.
— — on *Pyrus calleryana*, resistance to, 11.
— — on Rosaceae, legislation against, in Portugal, 672.
[*Bacillus*] *aroideae* on Chinese cabbage in Japan, 426.
— — on tobacco in Sumatra, 332.
— — on tomato (?) in Bermuda, 421; in Trinidad, 121; in U.S.A., 121.
— —, serological tests with, 426.
— *carotovorus*, antagonism of, to *Glomerella cingulata* and *Nigrospora* in mixed cultures, 109.
— — on carrot in Ceylon, 77; in U.S.A., 4.
— — on crucifers in U.S.A., 546.
— — on tomato (?) in Bermuda, 421; in U.S.A., 121.
— —, serological tests with, 426.
— *caulivorus* on begonia in France considered a parasitic form of *B. fluorescens liquefaciens*, 448.
— (?) *citrimaculans* on lemon in Sicily, 283.
— *coffeicola* on coffee in the Belgian Congo, 91.
— *coli*, *Bacterium tabacum* and soft rotting bacteria considered variants of, 426.
— —, serological tests with, 426.
— *fluorescens liquefaciens*, *B. caulivorus* a parasitic form of, 448.
(?) — *lathyri* on broad beans in U.S.A., 415.
— — on tomato, relation of, to stripe, 540, 731.
(?) — *mangiferae* on mango in Egypt, 749.
— *mesentericus vulgatus*, antagonism of, to fungi, 109.
— *mycoides* on beet in Czecho-Slovakia, 348.
— *phytophthorus* on potato, control, 719; effect of, on metabolism and temperature, 320; occurrence in Denmark, 715; in Germany, 266, 320, 719; in New S. Wales, 320; in U.S.A., 651; study on, 320; varietal susceptibility to, 716.
— —, serological tests with, 426.
— *prodigiosus* on bread in Russia, 625.
— *zeae* on maize in Russia, 165.
Bacteria, antagonism of, to *Ophiobolus graminis*, 684.
—, effect of ultra-violet rays on, in comparison to tobacco mosaic virus, 461.
— in butter in U.S.A., 695.
— in soil, effect of rape cake on numbers of, 593.
— on artificial silk in England, 445.
— on maize in U.S.A., 364.
— on peas in U.S.A., 412; *Aphanomyces euteiches* and *Fusarium* as secondary to, 413.
— on radish in Germany, 351.
Bacterial blight of broad beans in U.S.A., 415.
— decay of stone in England, 645.
— disease of apple in U.S.A., 13.
— — of beet in Czecho-Slovakia, 546.
— — of *Carya ovalis* in U.S.A., 601.
— — of pear in U.S.A., 13.
— — of pecan in U.S.A., 601.
(?) — — of *Prunus laurocerasus* in Switzerland, 97.

[Bacterial disease] of raspberry in U.S.A., 455.
— — of sesame in Tanganyika, 552.
— — of walnut in U.S.A., 601.
— — of *Zostera marina*, see Dying-off of.
— gummosis of plum in U.S.A., 180.
— root rot of beet in Austria, 135.
— rot of lettuce in U.S.A., 270.
Bacteriophage, medium for the cultivation of, 217.
— of *Pseudomonas citri*, 551.
—, size of particles of, 309.
Bacteriosis of begonia in Denmark, 448.
— of cotton in the Caucasus, 507.
— of maize in the Caucasus, 505.
— of oak in Jugo-Slavia, 600.
Bacterium of the *proteus* type, antagonism of, to fungi in mixed cultures, 109.
— on *Gypsophila paniculata* forming galls in U.S.A., 224.
Bacterium albilineans on sugar-cane, method of isolating, 114; occurrence in Australia, 114; in Mauritius, 553; in Queensland, 245; transmission of, by knives, 553; varietal susceptibility to, 245.
— *aleuritidis* can infect bean and *Ricinus communis*, 130.
— — on *Aleurites fordii* in U.S.A., 130.
— *angulatum* on tobacco in S. Rhodesia, 775.
— *apii* on celery in U.S.A., 495.
— *atrofaciens* on barley in U.S.A., 431.
— — on wheat in New S. Wales, 430; in U.S.A., 431.
— *citriputeale* on citrus in S. Australia, 141.
— *cucurbitae* on cucumber in India and U.S.A., 547.
— — on squash in U.S.A., 547.
— —, variation in, 81.
— *dissolvens* on maize in U.S.A., serological tests with, 426.
— *fici* on fig in Italy, 746.
— *flaccumfaciens* on bean in U.S.A., 71.
— *fluorescens* in sulphur fungicides in U.S.A., 107.
(?) — *herbicola aureum* on ivy in U.S.A., 98.
— *holci* on maize in Russia, 165.
— *juglandis* on walnut, control, 182, 338; dissemination of, 338; factors affecting, 253, 338, 339; notes on, 271, 339; occurrence in France, 253; (?) in Italy, 339; in Tasmania, 271; in U.S.A., 182, 338; overwintering of, 338; studies on, 253, 338; varietal susceptibility to, 253.
— *lacrymans* on cucumber, 547.
— *maculicola* on *Brassica* in Japan, 554.
— — on cauliflower in Japan, 554; in Tasmania, 271.
— — on radish in Japan, 554.
— *malvacearum* on cotton, control, 91, 421, 439; dissemination of, 92, 421; dissociation of, 141; factors affecting, 22, 92, 141, 421, 508, 775; internal infection of seed by, 141; notes on, 421, 566; occurrence in the Caucasus, 507; in Eritrea, 746; in Fiji, 439; in Japan, 554; in S. Rhodesia, 775; in the Sudan, 91, 439; in Uganda, 421, 439; phenology of, 507; strains of, 141; studies on, 22, 91, 421, 507; varietal resistance to, 439, 507.
[*Bacterium malvacearum*] on *Eriodendron anfractuosum* in Guatemala, 169.
— *marginale* on lettuce, control, 353; occurrence (?) in Belgium, 677; in England, 353; (?) in W. Europe, 677.
— *marginatum* on gladiolus in U.S.A., 356.
— *medicaginis* on lucerne in U.S.A., 177.
— — var. *phaseolicola* on bean, control, 1, 71; losses caused by, 142; method of inoculation with, 742; occurrence in Poland, 741; in S. Australia, 142; in Tasmania, 271; in U.S.A., 1, 71; studies on, 741, 742; varietal resistance to, 742.
— *melleum* on tobacco in Rumania, 791.
— *mori* on mulberry in Tasmania, 271.
— *phaseoli* on bean, control, 1, 71, 415; factors affecting, 415, 671; occurrence (?) in Kenya, 9; in S. Africa, 142; in U.S.A., 1, 71, 671; in Victoria, 415; study on, 415; varietal resistance to, 415.
— — on *Phaseolus lunatus* in U.S.A., 671.
— — var. *fuscans* on bean in U.S.A., 71.
— (?) — var. *sojense* on soy-bean in Japan, 554.
— *pisi* on peas in U.S.A., 263.
— *pruni* on peach in U.S.A., 145, 268.
— *pseudozoogloeae* on tobacco in Sumatra, 471.
— *rathayi* on *Dactylis glomerata* in Denmark, 294; in Germany, 571.
— *rhizogenes*, effect of, on root formation by chicory and horse chestnut, 554.
— *ricini* on *Ricinus communis* in Japan, 554.
— *salicis*, difference between *Pseudomonas saliciperda* and, 61.
— *solanacearum* can infect chilli, 793; *Datura stramonium*, *Impatiens balsamina*, potato, and *Solanum integrifolium*, 488.
— — on chilli in Ceylon, 77.
— — on potato in Ceylon, 77; in Java, 425; varietal resistance to, 793.
— — on Solanaceae in Porto Rico, 793.
— — on tobacco, control, 793; factors affecting, 145; notes on, 118, 333, 470; occurrence in Java, 118; in Malaya, 355; in Porto Rico, 793; in Sumatra, 333, 470; in U.S.A., 145; study on, 793; varietal resistance to, 793.
— — on tomato, note on, 793; occurrence in Ceylon, 77; in Morocco, 488; in Porto Rico, 793.
— *tabacum* can infect *Nicotiana*, 401.
— — on tobacco, control, 475, 491; factors affecting, 490, 600, 775; method of inoculation with, 600; occurrence (?) in Belgium, 7; in Canada, 475; in France, 490; in Germany, 600; in S. Rhodesia, 775; in Switzerland, 678; in U.S.A., 401; production of toxin by, 401; reaction

of leaves to, 476 ; varietal resistance to, 600.
[*Bacterium tabacum*] regarded as a variant of *Bacillus coli*, 426.
— —, serological tests with, 426.
— *tomato* can infect eggplant, 555.
— — on tomato in Japan, 555.
— *translucens* var. *undulosum*, antagonism of, to *Ophiobolus graminis*, 684.
— — — — on wheat, effect of, on yield, 13 ; occurrence in Belgium, 7 ; in Kenya, 9, 13.
— *tumefaciens*, action of, on *Ascidia mentula* and *Nereis diversicolor*, in comparison with that of cancer-inducing substances, 83 ; on *Phascolosoma vulgare*, 83.
— — can infect beet, 516 ; *Carnegiea gigantea*, 358 ; *Datura stramonium*, 680 ; *Euphorbia helioscopia*, 81 ; oleander, 81 ; *Ricinus communis*, (?) 270, 406 ; sunflower, 81 ; tobacco, 516 ; tomato, 516, 680, 699 ; and *Tropaeolum*, 699.
— —, effect of ambient radiation on gall formation by, 82 ; of cosmic rays on, 82, 6 ; of Hertzian waves on, 82 ; of X-rays on, 680.
— —, gall formation by, 82, 358, 637.
— —, hydrogen-ion concentration of tumours caused by, 148.
— —, morphology of, 81.
— —, nitrogen content of tumours caused by, 148.
— — on apple in U.S.A., 637.
— — on bean can cause vascular necrosis, 616.
— — on beet, 148.
— — on begonia in Germany, 448.
— — on *Canavalia ensiformis*, 148.
— — on chrysanthemum in England, 698 ; in Germany, 578.
— — on cucumber, 148.
— — on *Cupressus arizonica* in U.S.A., 270, 405.
— — on dahlia in Austria, 26.
— — on fruit trees in the Caucasus, 516.
— — on *Impatiens balsamina*, 148.
— — on *Juniperus sabina* in U.S.A., 406.
— — on *Pelargonium*, effect of ambient radiation and Hertzian waves on, 82 ; transmitted from chrysanthemum, 699 ; from *Salix caprea*, 799.
— — on *Pelargonium zonale*, immunization against, 496.
— — on raspberry in Holland, 705.
— — on rose in U.S.A., 633.
— — on *Salix caprea* in Finland, 797.
— — on *Sedum*, 148.
— — on sunflower, 148.
— — on tomato, biochemistry of, 148 ; polyploidy in a shoot from tumour caused by, 59.
— —, physiology of, 81, 148.
— —, 'star' formation by, 81.
— *vascularum* on sugar-cane in Barbados, 788 ; in Mauritius, 553 ; in Porto Rico, 326, 788 ; in Queensland, 787 ; in Réunion, 327 ; in St. Kitts, 57 ; transmission of, by knives, 553 ; varietal resistance to, 57, 326, 327, 787, 788.
[*Bacterium*] *vesicatorium* on tomato, 555.
— —, variation in, 81.
— *vignae* on *Phaseolus lunatus* in U.S.A., 2.
— — var. *leguminophila* on bean in U.S.A., 71.
— *viridiflava* on bean in U.S.A., 71.
— *xylinum*, use of, in the preparation of tea cider, 249, 597, 661.
Baetis rhodani, *Genistella ramosa* on, in Alpine waters, 512.
Baïoud disease of date palm, see *Cylindrophora albedinis* on.
Bamboo (*Bambusa*, *Phyllostachys*, &c.), *Coniosporium shiraianum* on, in Portugal, 726.
—, *Corticium koleroga* on, in India, 76.
—, *Scolecotrichum graminis* on, in China, 395.
—, *Shiraia bambusicola* on, in China, 247.
Banana (*Musa* spp.), *Albugo* on, see *Cystopus* on.
—, *Alternaria* on, 39.
—, *Armillaria mellea* on, in Tanganyika, 552.
—, *Aspergillus wentii* on, 39.
—, *Botryodiplodia theobromae* on, 39 ; in Trinidad, 105.
—, bunchy top of, in Egypt, 749.
—, *Ceratostomella paradoxa* on, 39.
—, *Cercospora kopkei* on, from Jamaica and Brazil, 39.
—, — *longipes* on, from Brazil, 39.
—, — *musae* on, in Fiji, 457 ; in Queensland, 456.
—, *Cladosporium herbarum* on, 39.
—, *Colletotrichum dematium* on, 39.
—, — *falcatum* on, from Brazil, 39.
—, *Cystopus* on, 39.
—, *Fusarium* on, in Australia, 40.
—, — *aquaeductum* on, 39.
—, — *lateritium* on, in Trinidad, 382.
—, — *moniliforme* var. *subglutinans* on, in Trinidad, 382.
—, — *oxysporum cubense* on, breeding against, 39, 104, 303 ; control, 38, 303, 381 ; factors affecting, 38 ; legislation against, in Mexico and other countries, 303 ; losses caused by, 39 ; occurrence in the Canary Islands, 381, 773 ; in India, 267 ; in Jamaica, 38, 104 ; in Mexico, 303 ; studies on, 38, 381 ; varietal resistance to, 303, 381.
—, — *semitectum* var. *majus* on, 39.
—, *Gibberella saubinetii* on, from Brazil and the Canaries, 39.
—, *Gloeosporium musarum* on, 39 ; in Australia, 40.
— heart rot in Queensland, 201.
—, *Helminthosporium sacchari* on, 39.
—, — *torulosum* on, 39 ; in Sierra Leone, 552.
—, leaf speckle of, in Queensland, 457.
—, *Leptosphaeria musarum* on, in Ceylon, 458.
—, *Macrophoma musae* and *Mucor mucedo* on, 39.

[Banana], *Nigrospora sphaerica* on, in Eritrea, 745.
—, *Oidium lactis* f. *musarum* on, from Brazil and the Canaries, 39.
—, *Penicillium crustaceum* on, 39.
—, *Pestalozzia* on, in Sierra Leone, 202.
—, — *leprogena*, *Rhizopus nigricans*, and *Saccharomyces* on, 39.
—, *Scolecotrichum musae* on, (?) in Queensland, 458; in Sierra Leone, 552.
—, squirter disease of, in Australia, 40.
—, *Stachylidium theobromae* on, in Eritrea, 745.
—, stem-end rot of, in Australia, 40.
—, tip rot of, in Trinidad, 382.
—, *Torula*, *T. variabilis*, and *Trichothecium roseum* on, 39.
—, *Verticillium* on, 39; in Australia, 40; in Sierra Leone, 552.
—, — *albo-atrum* on, 39.
—, — — var. *medium* on, in Germany (imported), 117.
—, — (?) *candelabrum* on, from the Canaries, 39.
— wastage in storage, fungi associated with, in Trinidad, 106.
—, yellow leaf spot of, in Queensland, 458.
Barbarea rupicola, *Plasmodiophora brassicae* on, in Russia, 346.
Barberry (*Berberis*), eradication of, in Esthonia, 800; in Germany, 736; in Latvia, 672; in Rumania, 427; in U.S.A., 203, 400.
—, *Puccinia arrhenatheri* on, differentiation of *P. graminis* and *P. pygmaea* from, 536.
—, — *graminis* on, aecidiospore discharge of, 15; differentiation of *P. arrhenatheri* and *P. pygmaea* from, 536; factors affecting, 15; fertilization in, 318; hybridization of, 86; legislation against, in Esthonia, 800; in Germany, 736; in Latvia, 672; in U.S.A., 400; notes on, 7, 294, 556; occurrence in Germany, 736; in Irish Free State, 7; in Italy, 497; in Latvia, 672; in Sweden, 294; in U.S.A., 15, 86, 400, 556; physiologic forms of, 15, 86; specific and varietal resistance to, 7, 15, 294, 400.
—, — *mirabilissima* on, in Germany, 375, 578; in Sweden, 293, 330; revised diagnosis of, 330; study on, 293.
—, — *pygmaea* on, in Russia, 536; differentiation of *P. graminis* from, 536.
Barley (*Hordeum*), *Bacterium atrofaciens* on, in U.S.A., 431.
—, (?) *Calonectria graminicola* on, in England, 754.
—, *Cercosporella herpotrichoides* can infect, 503.
—, *Corticium solani* on, in S. Australia, 159.
—, effect of leaf recision on development of, 753.
—, *Erysiphe graminis* on, in Germany, 620; in U.S.A., 78.
—, *Fusarium* on, in Germany, 150, 157.
—, — *culmorum* on, in Canada, 502.
[Barley, *Fusarium*] *moniliforme* var. *majus* can infect, 590.
—, *Gibberella fujikuroi* on, stimulatory effect of, 590.
—, — *saubinetii* on, in the Argentine, 683; in U.S.A., 614.
—, grey speck of, in Sweden, 19.
—, *Helminthosporium gramineum* on, control, 16, 84, 152, 161, 162; damages for negligence in control of, 161; effect of, on host, 209; factors affecting, 162; losses caused by, 161; method of inoculating, 162; occurrence in Austria, 16; in Germany, 84, 152, 161, 209; in Great Britain, 162; in U.S.A., 614; production of pycnidia by, 162; studies on, 162; varietal resistance to, 162, 614.
—, — *sativum* on, in the Argentine, 683; in U.S.A., 755.
—, — *teres* on, in England and S. Africa, pycnidial production by, 163.
—, *Lagena radicicola* on, in Canada, 749.
—, *Leptosphaeria herpotrichoides* on, in Germany, 150, 157.
—, *Ophiobolus graminis* on, effect of cultural practices on, 157; note on, 19; occurrence in the Argentine, 683; in Germany, 157.
—, — *herpotrichus* on, in Germany, 150, 157.
—, *Penicillium* on, in relation to bronchial troubles in England, 511.
—, *Puccinia* on, in Bulgaria, Poland, and Rumania, 150.
—, — *anomala* on, genetics of resistance to, 78; grass hosts of, 274; occurrence in Germany, 149, 273; in U.S.A., 78; physiologic forms of, 78, 274; varietal resistance to, 78.
—, — *glumarum* on, in Germany, 149.
—, — *graminis* on, genetics of resistance to, 753; occurrence in Germany, 149; in U.S.A., 753; physiologic forms of, 753; transmitted from wheat, 274, 753.
—, — *hordeina* on, in Siberia, 307.
—, — *triticina* can infect, 274.
—, reclamation disease of, in Denmark, 656; in Germany, 87.
—, *Tilletia paničičii* on, 559; in the Caucasus, 560.
—, (?) *Typhula graminum* on, in U.S.A., 615.
—, *Ustilago hordei* on, chemical composition of spores, 584; control, 153, 617, 622; cytology of, 210; factors affecting, 17; genetics of, 17; hybridization of, with *U. nuda*, 280; occurrence in Belgium, 280; in the Caucasus, 560; in Rumania, 549; in Russia, 617; in Tunis, 153; in Western Australia, 622; study on, 280.
—, — *nigra* on, in U.S.A., 161.
—, — *nuda* on, control, 280, 614, 617, 644; effect of X-rays on, 644; hybridization of, with *U. hordei*, 280; occurrence in Belgium, 280; in the Caucasus, 560; in Rumania, 549; in Russia, 617; in U.S.A., 161, 614, 644;

in Western Australia, 622; study on, 280.
[Barley], virus disease of, in Siberia, 307.
Basswood, see Lime (*Tilia*).
Bayer dust 649, use of, against *Actinomyces scabies* on potato, 462.
Beans, *Ascochyta phaseolorum* on, in Sweden, 330; forms of, 330.
—, (?) *Bacillus lathyri* on, in U.S.A., 415.
—, bacterial blight of broad, in U.S.A., 415.
—, *Bacterium aleuritidis* can infect, 130.
—, — *flaccumfaciens* on, in U.S.A., 71.
—, — *medicaginis* var. *phaseolicola* on, control, 1, 71; losses caused by, 142; method of inoculation with, 742; occurrence in Poland, 741; in S. Australia, 142; in Tasmania, 271; in U.S.A., 1, 71; studies on, 741, 742; varietal resistance to, 742.
—, — *phaseoli* on, control, 1, 71, 415; factors affecting, 415, 671; occurrence (?) in Kenya, 9; in S. Africa, 142; in U.S.A., 1, 71, 671; in Victoria, 415; study on, 415; varietal resistance to, 415.
—, — — var. *fuscans* on, in U.S.A., 71.
—, — *tumefaciens* on, can cause vascular necrosis, 616.
—, — *vignae* var. *leguminophila* on, in U.S.A., 71.
—, — *viridiflava* on, on U.S.A., 71.
—, *Cercospora cantuariensis* can infect, 263.
—, — *cruenta* on, in China, 725.
—, — *fabae* on, in England, 263.
—, *Colletotrichum lindemuthianum* on, control, 1, 71; factors affecting, 671; occurrence in Réunion, 680; in U.S.A., 1, 71, 671; varietal resistance to, 71.
—, *Corticium sasakii* on, in Japan, 331.
—, — *solani* on, in U.S.A., 133, 671.
—, curly top of, control, 1; *Eutettix tenella* in relation to, 195; occurrence in U.S.A., 1, 195, 196.
—, deterioration of, in transit in U.S.A., 672.
—, *Erysiphe polygoni* on, in U.S.A., 2, 495, 673.
—, *Fusarium martii phaseoli* on, in U.S.A., 71.
—, — *orthoceras* var. *pisi* on broad, in U.S.A., 71.
—, — *oxysporum* on broad, in Greece, 469.
—, *Isariopsis griseola* on, in Réunion, 680; in U.S.A., 2.
—, *Macrophomina phaseoli* can infect, 267; occurrence in U.S.A., 2.
— mosaic, control, 204, 413; genetics of resistance to, 614; occurrence in Egypt, 749; in Italy, 413; in S. Africa, 142; in U.S.A., 1, 71, 204, 414, 614, 615, 741; studies on, 413, 741; transmission of, by *Aphis gossypii*, *A. rumicis*, *Brevicoryne brassicae*, *Hyalopterus atriplicis*, and *Macrosiphum ambrosia*, 414; by *M. gei* and *M. pisi*, 414, 614; by *Myzus persicae*, 414; by ovule and pollen, 414; by seed, 413, 741; from or to clover, 414, 614, 741; lucerne, 741; *Melilotus alba*, 414, 614, 741; *M. officinalis*, peas, and sweet peas, 414, 741; soy-bean, 614; types of, 414, 614, 741; varietal resistance to, 71, 413, 414, 614, 615, 741.
[Beans], obscure disease of, in France, 491.
—, *Ophiobolus graminis* can infect, 19.
—, *Phyllosticta phaseolorum* on, in Spain, 330.
—, *Phytomonas* on, in Denmark, 348.
—, — *viridiflava* var. *concentrica* on, in Denmark, 348.
—, *Pythium* on, in U.S.A., 679.
—, — *epigynum* can infect, 331.
—, — *fabae* on, in Australia, 135.
—, reclamation disease of, in Denmark, 656.
—, *Rhizoctonia* on, in U.S.A., 71, 679.
—, *Sclerotinia sclerotiorum* on, in U.S.A., 71, 292.
—, *Sclerotium rolfsii* on, in U.S.A., 671.
—, *Thielavia basicola* on, in U.S.A., 71.
—, tobacco mosaic can infect, 120.
—, — ring spot can infect, 121.
—, *Uromyces appendiculatus* on, control, 1, 71; influence of narcosis on susceptibility to, 45; nature of resistance to, 415; occurrence in U.S.A., 1, 71, 415.
—, — *fabae* on, in Egypt, 749; in Japan, 596.
—, 'whitewash' of broad, in Spain, 354.
—, yellowing (non-parasitic) of, in U.S.A., 496.
—, Lima, see *Phaseolus lunatus*.
Beauveria globulifera on locusts in the Philippines, 216, 217.
— —, use of, for the control of *Promecotheca cumingii* on the coco-nut in the Philippines, 217.
Beech (*Fagus*), *Asterosporium hoffmanni* can infect, 44.
—, *Ceratostomella fagi* on, 665; in Germany, 195.
—, — *ulmi* can infect, 665.
—, *Elaphomyces* as mycorrhizal symbiont of, in Scotland, 529.
—, *Ganoderma applanatum* on, note on, 544.
—, *Nectria coccinea* on, in Canada and U.S.A., 405; *Cryptococcus fagi* in relation to, 405.
—, — *galligena* and *Phlebia aurantiaca* can infect, 44.
—, phloem necrosis in, 43.
—, *Pholiota aurivella* can infect, 44.
—, *Phytophthora cambivora* on, in England, 334.
—, *Pleurotus ostreatus* and *Polyporus squamosus* can infect, 44.
—, *Stereum hirsutum* can infect, 44; occurrence in France, 664.
—, — *rugosum* can infect, 44.
Bees, dissemination of *Bacillus amylovorus* by, on apple and pear, 13, 701.
Beet (*Beta vulgaris*), *Acrostalagmus* on, in Czecho-Slovakia, 348.
—, *Aphanomyces levis* on, in Austria, 135; in Czecho-Slovakia, 546.
—, *Bacillus mycoides* on, in Czecho-Slovakia, 348.

[Beet], bacterial disease of, in Czecho-Slovakia, 546.
—, — root rot of, in Austria, 135.
—, *Bacterium tumefaciens* can infect, 516; biochemistry of, 148.
—, *Cercospora beticola* on, control, 135, 349, 416; effect of, on yield, 349, 549; note on, 676; occurrence in Austria, 135; in Belgium, 676; in Czecho-Slovakia, 546; in Rumania, 549; in Spain, 349, 416; study on, 349.
—, *Corticium solani* on, in U.S.A., 133.
—, curly top of, control of insect vector of, 196; host range of, 446, 447; occurrence in U.S.A., 195, 196, 349, 446, 748; transmission of, by *Eutettix tenella*, 195, 196, 446, 748; by needle, 349; to spinach, 349; to tomato, 349, 748; varietal resistance to, 748.
—, dry and heart rot of, control, 2, 135, 609; factors affecting, 135, 545; losses caused by, 266; occurrence in Austria, 135; in Czecho-Slovakia, 545; in France, 135; in Germany, 266, 609; in Holland, 2; relation of boron deficiency to, 2, 609; study on, 2. (See also *Mycosphaerella tabifica*, *Phoma betae*.)
—, *Helicobasidium purpureum* on, control, 135; notes on, 348; occurrence in Austria, 135; in Czecho-Slovakia, 348, 546.
—, mosaic of, cytology of, 263; occurrence in Russia, 263; in U.S.A., 673; properties of virus of, 674; studies on, 263; transmission of, by *Macrosiphum gei* and *Myzus persicae*, 674; to spinach, 674; types of, 263.
—, *Mycosphaerella tabifica* on, in Rumania, 549. (See also *Phoma betae* on.)
—, *Penicillium crustaceum* can infect, 349.
—, *Peronospora schachtii* on, in Austria, 135; in Czecho-Slovakia, 546.
—, *Phoma betae* on, in Austria, 135; in Czecho-Slovakia, 546. (See also *Mycosphaerella tabifica* on.)
—, *Phyllosticta betae* on, in Italy, 660.
—, *Pythium aphanidermatum* on, in Austria, 135.
—, — *de Baryanum* on, in Austria, 135; in Czecho-Slovakia, 546; in Germany, 266.
—, *Ramularia betae* on, in Austria, 135; in Rumania, 549.
—, *Rhizopus nigricans* can infect, 349.
— scab in Austria, 135; in Czecho-Slovakia, 545.
—, *Typhula variabilis* on, in Italy and Spain, 416.
—, *Uromyces betae* on, control, 135; fat formation round uredosori of, 317; occurrence in Austria, 135; in Czecho-Slovakia, 546; in Germany, 317.
—, *Urophlyctis leproides* on, in Italy, 537.
Begonia, *Bacillus caulivorus* on, in France regarded as a parasitic form of *B. fluorescens liquefaciens*, 448.
—, *Bacterium tumefaciens* and *Botrytis cinerea* on, in Germany, 448.
—, *Cercospora* on, in Germany and N. America, 448.
[Begonia], *Coleosporium begoniae* on, in Italy and Mexico, 448.
—, *Corticium solani* on, in Germany, 448.
—, *Gloeosporium begoniae* on, in Italy and N. America, 448.
—, leaf bacteriosis of, in Denmark, 448.
—, *Moniliopsis aderholdi* on, in Germany, 448.
—, *Mycosphaerella begoniae* on, in Ecuador, 448.
—, *Myxosporium sordidum* on, in Europe and S. America, 448.
—, *Oidium begoniae* on, in America and Denmark, 448.
—, *Phyllachora begoniae* on, in Ecuador, 448.
—, *Phyllosticta begoniae* on, in Brazil, France, Germany, Italy, and Portugal, 448.
—, *Physarum gyrosum* and *Phytophthora omnivora* on, in Germany, 448.
—, *Puccinia granularis* on, in S. Africa, 448.
—, *Pythium de Baryanum* on, in Germany, 448.
—, *Rosellinia necatrix* on, in France, 448.
—, *Septoria* and *Thielavia basicola* on, in Germany, 448.
'Belaât' of date palm, see *Phytophthora* on.
Bellis perennis, beet curly top virus can infect, 447.
Bemisia, transmission of leaf curl of tobacco and *Zinnia elegans* by, in Java, 475.
— *mosaicivecta* transmitting cassava mosaic in the Belgian Congo, 137.
Bentonite, use of, with copper compounds, against fruit diseases, 709.
Benzaldehyde, toxicity of, to *Sclerotinia americana*, 229.
Benzene and benzine, toxicity of, to *Coniophora cerebella* and *Merulius lacrymans*, 261.
Benzoic acid, regulations for use of, in food in Holland, 524; in various countries, 695.
— —, toxicity of, to *Trichophyton mentagrophytes*, 509; to *T. roseum*, 523.
Benzoin aestivale, *Gloeodes pomigena* on, in U.S.A., 206.
Benzol, see Benzene.
Berberis, see Barberry.
Beta vulgaris, see Beet.
Betanal, determination of mercury in, 306.
Betula, see Birch.
Bifusella faullii on *Abies balsamea* in Canada, 255.
— *linearis* on pine in Germany, 667; *Hypoderma lineare* synonym of, 667.
Birch (*Betula*), *Torula ligniperda* on, in Canada, 123.
—, 'wisa' disease of, in Scandinavia, 253.
Bitter pit of apple, control, 103; etiology of, 103; factors affecting, 103, 142, 573; occurrence in New Zealand, 573; in S. Africa, 142; in U.S.A., 100, 103.

Björklund dusting apparatus, 323.
'Black bean' disease of coffee in India, 22.
Blackberry (*Rubus* spp.), *Gloeodes pomigena* on, in U.S.A., 298.
—, *Gymnoconia interstitialis* on, in U.S.A., 706.
— mosaic in U.S.A., 770.
— rosette in U.S.A., 680.
—, *Septoria rubi* on, in U.S.A., 79.
—, *Verticillium dahliae* can infect, 470.
'Black end' of pear in U.S.A., 103, 615; in Victoria, 574; varietal susceptibility to, 574.
— germ of wheat in Siberia, 160.
Blastocystis hominis in the house fly in Italy, 508.
Blastomyces, see *Blastomycoides*.
Blastomycoides not accepted as genus for *Coccidioides immitis*, 170.
— on man, 691; in U.S.A., 628.
— *dermatitidis* renamed *Endomyces dermatitidis* (q.v.), 441.
— *immitis* renamed *Geotrichum immite*, 171.
— *tulanensis* on man in N. America, 171; renamed *Monosporium tulanense*, 171.
Blastophoma (?) *douglasii* on *Pseudotsuga taxifolia*, conidial formation in, 790; *Phoma douglasii* renamed, 790.
— *thuemeniana* on larch, conidial formation in, 790; *Sphaeropsis pityi* renamed, 790.
Bleaching powder, see Chloride of lime.
Blossom-end rot of tomato, control, 733; factors affecting, 459, 733; occurrence in New Zealand, 733; in U.S.A., 121, 459.
Blotchy ripening of tomato in Jersey, 549. (See also Potash deficiency of.)
Blue stain of timber in Russia, 257.
Boehmeria candidissima, *B. cylindrica*, and *B. japonica*, fungi on, in Russia, 631.
— *nivea*, *Coniothyrium boehmeriae*, *Hendersonia boehmeriae*, and *Microdiplodia boehmeriae* on, in Russia, 632.
— — and *B. tenacissima*, fungi on, in Russia, 631.
Boletinus porosus, *Boletus bovinus*, *B. castaneus*, *B. granulatus*, and *B. luteus* on pine forming mycorrhiza, 778.
Bombyx mori, see Silkworms.
Borax as a constituent of brogdite, 226.
—, use of, against *Alternaria citri* and other rotting fungi on orange, 215; against heart and dry rot of beets, 2, 609; against *Penicillium digitatum* on orange, 759; against timber moulding fungi, 344; against timber staining fungi, 344, 669.
Bordeaux dusts, analyses of American brands of, 708.
— mixture, applications of, in relation to cyanide injury, 690.
— —, combination of, with oil emulsion-cresylic acid sprays, 711.
— —, cost of, 380.
— —, effect of calcium carbonate on adhesiveness of, 73; of, on assimilation of wheat, 383; on flavour and sugar content of apples, 85; on transpiration, 459; of wetting agents on the spray deposit of, 181.
[Bordeaux mixture] injury, 29, 100, 101, 146, 206, 297, 300, 639, 657, 709, 775, 767.
— — -lead arsenate, methods for analysis of, 708.
— —, solubility of copper in, 710.
— —, 'instant', use of, against *Alternaria solani* on potato, 654; against *Phytophthora infestans* on potato, 240, 654.
— —, Wacker's, 243.
— -oil emulsion, use of, against *Clasterosporium carpophilum* on stone fruits, 301.
— -sulphite lye, preparation and tests of, 774.
Boric acid, use of, against heart and dry rot of beet, 2; against wood-staining fungi, 669.
Boron deficiency in relation to heart and dry rot of beet, 2, 609; to tipburn of lettuce, 611.
Boronia, mycorrhiza of, in New S. Wales, 311.
— *megastigma*, *Puccinia boroniae* on, in Victoria, 97.
Botryodiplodia theobromae on avocado pear in Brazil, 707.
— — on banana, 39; in Trinidad, 105.
— — on cacao, 207; in the Belgian Congo, 80.
— — on coco-nut in Indo-China, 148.
— — on cotton in Uganda, 422.
— — on *Hevea* rubber in Ceylon, 785.
— — on sweet potato in Uganda, 422.
— *ulmicola* on elm in U.S.A., 125.
Botryosphaeria dothidea on rose in England, Europe, and Germany, 447.
— *ribis* can infect orange, 283.
— — on lemon in Palestine, Sicily, and Tunis, 283.
— — var. *chromogena* on rose in U.S.A., 633.
Botrytis in air of apple orchards in England, 32.
— in soil in Siberia, 191.
— on apple in Switzerland, 8.
— on avocado pear in Sierra Leone, 553.
— on China aster in U.S.A., 448.
— on *Gloxinia* in Germany, 97.
— on gooseberry in Holland, 705.
— on *Jatropha podagrica* in Sierra Leone, 553.
— on lily in U.S.A., 233.
— on *Rhododendron* in U.S.A., 696.
— on rose in U.S.A., 633.
— on sunflower in Russia, 571.
— on vine, *Sclerotinia fuckeliana* ascigerous stage of, 316.
— parasitizing *Cladosporium fulvum* in Germany, 194; osmotic capacity of, in relation to parasitism, 713.
—, toxicity of copper resinate and sulphate to, 182.
— *allii*, antagonism of bacteria to, in mixed cultures, 109.
— — on onion in Russia, 610; in S. Australia, 142.

[*Botrytis*] *cinerea*, action of certain volatile substances and gases on growth of, 46.
— —, antagonism of, to *Ophiobolus graminis*, 684.
— —, artificial immunization of plants against, 779.
— —, educability of, 141.
— —, effect of excretions of, on growth of wheat, 85 ; of X-rays on, 184, 185.
— —, nature of variation in, 316.
— — on alpine plants in Italy, 449.
— — on apple, specialized parasitism of, 184.
— — on begonia in Germany, 448.
— — on carrot in U.S.A., 4.
— — on chilli in U.S.A., 671.
— — on citrus in Sicily, 283.
— — on conifers in Czecho-Slovakia, 340.
— — on crucifers in U.S.A., 546.
— — on dahlia in Austria, 25.
— — on peach in U.S.A., 378.
— — on pear, effect of carbon dioxide on, 102.
— — on pine in Czecho-Slovakia, 340.
— — on potato in U.S.A., 612.
— — on rose in England, 570.
— — on strawberry in U.S.A., 102.
— — on tomato in Germany, 662.
— — on *Veronica urticaefolia* in Italy, 449.
— — on vine in U.S.A., 103.
— —, osmotic capacity of, in relation to germination, 713.
— —, races of, 141.
— — f. *lini* on flax in Holland, 372.
— *convoluta* on iris in Canada, (?) England, (?) France, (?) Germany, (?) Holland, and U.S.A., 293.
— *destructor* synonym of *Peronospora destructor*, 484.
— *paeoniae*, antagonism of bacteria to, 109.
— *tulipae*, antagonism of bacteria to, 109.
— — on tulip in Canada, 96.
Bouisol, composition of, and use of, against *Plasmopara viticola* on vine, 199.
Box (*Buxus*), *Ascochyta buxina* on, in Portugal, 726.
—, *Chaetodochium buxi* on, *Volutella buxi* renamed, 634.
—, *Leptosphaeria buxina* on, in Portugal, 726.
Brachysporium, antagonism of bacteria to, 109.
— on chilli in Japan, 584.
— on *Cynodon dactylon* and *Cyperus iria* in Japan, 584.
— on rice in Indo-China, 146.
— on *Setaria italica* in Japan, 584.
—, saltation in, 584, 782.
Brassica, *Bacterium maculicola* on, in Japan, 554.
— *alba*, see Mustard.
— *campestris*, see Swedes, Turnip.
— *chinensis*, *Corticium solani* on, influence of nutrition on virulence of, 780.
— *napus*, see Rape.
— *nigra*, see Mustard.
— *oleracea*, see Brussels sprouts, Cabbage, Cauliflower.
— *pekinensis*, see Cabbage, Chinese.
[*Brassica*] *sinapis*, see Charlock.
Bread, *Aspergillus glaucus* on, in Russia, 625.
—, — *niger* on, in U.S.A., 757.
—, *Bacillus prodigiosus*, *Endomyces fibuliger*, *Monilia variabilis*, and *Neurospora sitophila* on, in Russia, 625.
—, *Penicillium expansum* on, in U.S.A., 757.
—, — *glaucum* on, in Russia, 625.
—, *Rhizopus nigricans* on, in Russia, 625 ; in U.S.A., 757.
—, *Thamnidium aurantiacum* on, in Russia, 625.
'Breaking' of tulips, complex nature of, 292, 633 ; occurrence in England, 633 ; in U.S.A., 292 ; relation of, to lily mosaic, 292 ; transmission of, by *Anuraphis tulipae*, *Macrosiphum gei*, and *Myzus persicae*, 633 ; types of, 633.
Bremia lactucae on lettuce in U.S.A., 417, 494.
Brevicoryne brassicae transmitting bean mosaic in U.S.A., 414.
Brogdite, composition and toxicity to *Penicillium expansum* of, 226.
Bromine compounds, effect of, on seed germination and growth, 535.
Bromus, *Erysiphe graminis* on, resistance to, 362.
—, *Puccinia graminis* can infect, 274.
— *arvensis*, *Puccinia glumarum* can infect, 273.
— —, *Ustilago bromivora* on, in Denmark, 294.
— *ciliatus*, *Gibberella saubinetii* can infect, 622.
— —, *Helminthosporium sativum* and *Ophiobolus graminis* can infect, 621.
— —, *Puccinia lolii* on, in Canada, 364.
— *inermis*, *Fusarium* on, in Canada, 621.
— —, *Gibberella saubinetii* can infect, 622.
— —, *Helminthosporium sativum* on, in Canada, 621.
— —, *Puccinia glumarum* can infect, 273.
— *latiglumis* and *B. porteri*, *Puccinia lolii* on, in Canada, 364.
— *sterilis*, *Ophiobolus graminis* on, in the Argentine, 683.
— —, *Puccinia bromina* on, in France, 177.
— —, — *secalina* can infect, 274.
Bronze leaf wilt of coco-nut in Jamaica, 90 ; in Trinidad, 143.
Brooming disease of *Robinia pseud-acacia* in U.S.A., 405.
Brown bast of *Hevea* rubber in the Belgian Congo, 80.
(?) — root rot of tea in Malaya, 355.
— — — of tobacco, calcium nutrition in relation to, 477; occurrence in U.S.A., 477, 493.
— spot of orange in Italy, 746; in U.S.A., 565.
— stain of orange in U.S.A., 565.
Brunchorstia destruens, not a stage of *Cenangium abietis* but of *Crumenula abietina* (q.v.), 667.
Brunissure of vine in France, 676.

Brussels sprouts (*Brassica oleracea*), *Plasmodiophora brassicae* on, in Denmark, 608; in Germany, 670.
Bucegia romanica, endophytic fungus in, in Rumania, 583.
Buckwheat (*Fagopyrum esculentum*), *Peronospora ducometi* on, in Poland, 550; *P. fagopyri* synonym of, 550.
—, *Puccinia fagopyri* on, in China, 248.
Bud rot of oil palm in Malaya, 354.
Bunchy top of banana in Egypt, 749.
— — of plantain in Ceylon, 77.
Bunonema, fungi capturing and killing, in U.S.A., 762.
Burgundy mixture, effect of acidity on copper components of, 711.
— — injury, 420.
— —, solubility of copper in, 710.
Burnettizing process of timber preservation, 70.
Butter, bacteria in, in U.S.A., 695.
—, fungi in, in Ireland, 440; in U.S.A., 220, 695; churns as a source of contamination by, 695.
—, *Phoma destructiva* in, in Irish Free State, 24; *Phyllosticta hedericola* identical with, 24.
—, — *nibernica* in, in Irish Free State, 24.
—, yeasts in, in U.S.A., 695.
Butternut (*Juglans cinerea*), (?) *Gnomonia leptostyla* on, in U.S.A., 251.
—, *Nectria* on, in U.S.A., 424.
Butyraldehyde, effect of, on growth of *Trichoderma lignorum*, 46.
Butyric acid, toxicity of, to *Sclerotinia cinerea*, 528.

Cabbage (*Brassica oleracea*), *Alternaria brassicae* on, in Italy, 200.
—, *Corticium solani* on, in U.S.A., 133.
—, *Fusarium conglutinans* on, in U.S.A., 608, 740.
—, *Phoma lingam* on, in Ireland, 481; in U.S.A., 482.
—, *Plasmodiophora brassicae* on, control, 233, 355, 493; factors affecting, 493; method of infection by, 347; occurrence in Denmark, 608; in Germany, 233, 670; in Lithuania, 493; in Russia, 346; in U.S.A., 355; varietal resistance to, 346, 608, 670.
—, *Pseudomonas campestris* on, in Sumatra, 425.
—, *Pythium ultimum* on, in U.S.A., 232.
—, *Sclerotinia sclerotiorum* on, in Bermuda, 421.
Cabbage, Chinese (*Brassica pekinensis*), *Bacillus aroideae* on, in Japan, serological tests with, 426.
—, —, *Cercospora bloxami* on, in U.S.A., 546.
—, —, *Cercosporella albo-maculans* on, in U.S.A., 546.
—, —, *Peronospora parasitica* on, in Japan, 1.
Cacao (*Theobroma cacao*), *Actinomyces cacaoi* on, from Nigeria, 149, 207.
—, *Armillaria mellea* on, 207.
—, *Aspergillus* on, lipase production by, 47.
[Cacao, *Aspergillus*] *gracilis*, *A. repens*, *A. ruber*, *A. sydowi*, and *A. terreus* on, in England, 149.
—, *Botryodiplodia theobromae* on, 207; in the Belgian Congo, 80.
—, canker of, in the Belgian Congo, 80.
—, *Cephaleuros mycoidea* on, 207.
—, *Colletotrichum* on, in the Belgian Congo, 80.
—, *Corticium salmonicolor* and *C. stevensii* on, 207.
—, — thread blight of, in the Belgian Congo, 80.
—, *Cylindrocarpon* on, in England, 149.
—, die-back of, in Surinam, 207.
—, *Fomes lamaoensis* on, see *F. noxius* on.
—, — *lignosus* on, 207; in the Belgian Congo, 80.
—, — *noxius* on, 207; in Java, 425.
—, *Fusarium* on, in England, 149.
—, *Ganoderma pseudoferreum* on, 207.
—, Marasmioid thread blight of, in the Belgian Congo, 80.
—, *Marasmius* and *M. byssicola* on, 207.
—, — *perniciosus* on, control, 143, 522; factors affecting, 144; legislation against, in the Dominican Republic, 836; in Trinidad, 144; note on, 435; occurrence in S. America, 207; in Surinam, 435; in Trinidad, 143, 522; study on, 143; viability of, 143.
—, — *scandens* on, 207.
—, moulding of W. African, in England, 149.
—, *Penicillium citrinum* on, in England, 149.
—, *Phytophthora palmivora* on, 207; control, 523; occurrence in Tanganyika, 552.
—, *Rosellinia* on, in Tanganyika, 552.
—, — *pepo* on, 207.
—, *Scopulariopsis* on, in England, 149.
—, *Sphaeronema* and *Sphaerostilbe repens* on, 207.
—, *Sporotrichum flavicans* and *Syncephalastrum cinereum* on, in England, 149.
—, *Taphrina bussei* on, in the Cameroons, 207.
—, *Ustulina zonata* on, 207.
Cactus mosaic in Germany, 570.
Cadmium chloride and sulphate, toxicity of, to *Mucor*, 693.
Cadophora fastigiata in the air at wood pulp mills in Norway, 69.
Caeoma deformans on *Thujopsis dolabrata*, 664.
Caffaro powder, use of, against *Actinomyces scabies* on potato, 320; against *Gibberella saubinetii* on wheat, 683; against *Glomerella cingulata* on avocado pear, 707; against *Helminthosporium sativum* on wheat, 688; against *Ramularia foeniculi* on *Foeniculum vulgare*, 245; against *Sphaceloma* on avocado pear, 707; against wheat bunt, 683.
Cajanus indicus, see Pigeon pea.
Calamagrostis, *Puccinia lolii* on, in Canada, 364.
—, — *pygmaea* on, in Russia, 536.

[*Calamagrostis*] *elongata*, *Puccinia lolii* on, in Canada, 364.
Calcium arsenate a constituent of chrompik, 617.
— arsenite dust, use of, against wheat bunt, 559.
— carbonate as an adhesive, 272.
— —, effect of, on adhesiveness of Bordeaux, 73.
— caseinate as a spreader, 356, 416.
— —, effect of, on germination of *Alternaria solani* and *Venturia inaequalis*, 268.
— chloride, toxic effects of, on plants, 781.
— cyanamide, use of, against *Aphanomyces raphani* on radish, 351; against *Sclerotinia sclerotiorum* on tobacco, 730; against wheat bunt, 153.
— — dust, effect of, on assimilation of wheat leaves, 383.
— deficiency in relation to damping-off of soy-beans in U.S.A., 109.
— monosulphide, a constituent of calmo-sul, 29.
— sulphide, use of, with lime-sulphur against *Venturia inaequalis* on apple, 678.
Calendula officinalis, beet curly top virus can infect, 447.
Calico of potato in U.S.A., 615; transmission of, by an insect, to chilli, eggplant, and tomato, 615.
Calla lily, see *Zantedeschia aethiopica*.
Callidea dregei transmitting *Nematospora coryli* and *N. gossypii* on cotton in S. Africa, 439.
Callistephus chinensis, see Aster, China.
Calluna vulgaris, asymbiotic growth of, 712.
Cal-mo-sul, calcium monosulphide as the active constituent of, 29.
—, use of, against apple diseases, 29, 423.
Calogreen, use of, against *Bacterium marginatum* on gladiolus, 356.
Calomel, see Mercurous chloride.
(?) *Calonectria graminicola* on barley in England, 754.
— — on cereals, control, 279, 623; factors affecting, 623; notes on, 503; occurrence in Austria, 623; in Germany, 279, 502, 686.
(?) — — on grasses, *Lolium italicum*, *L. perenne*, and oats in England, 754.
— — on rye, control, 16, 84, 152, 279; factors affecting, 754; occurrence in Austria, 16; in Germany, 84, 150, 152, 278, 279; strains of, 754.
— — on wheat in England, 754; in Germany, 158.
Calyptospora columnaris can infect *Abies balsamea*, 613.
— — on *Vaccinium corymbosum* and *V. pennsylvanicum* in U.S.A., 613.
— *goeppertiana* on *Abies sibirica* in Russia, 666.
Camellia sasanqua, *Exobasidium monosporum* on, in U.S.A., 698.
Camphor (*Cinnamomum camphora*), *Corticium sasakii* on, in Japan, 331.
[Camphor], *Rosellinia* on, in Malaya, 355.
Canavalia ensiformis, *Bacterium tumefaciens* on, action of tumour extracts of, 148.
Candida on man in the Channel Islands, 692; pathogenicity of, 691, 692.
— *albicans* on the fowl in U.S.A., 371.
— (?) — on man in U.S.A., 172.
— *krusei* on the fowl in U.S.A., 371.
— —, *C. macedoniensis*, *C. metalondinensis*, and *C. pinoyi*, physiology of, 568.
— *vulgaris* on man, notes on, 692.
Canker of cacao in the Belgian Congo, 80.
— of pine in U.S.A., 734.
— of poplar in France, 127.
— of tea attributed to *Helopeltis bergrothi*, 332; gnarled canker suggested as a name for, 9; occurrence (?) in India, 9; in Nyasaland, 9, 332.
— of tobacco in France a form of ring spot, 489.
Cannabis sativa, see Hemp.
Cantaloupe (*Cucumis melo*), *Erysiphe cichoracearum* on, in U.S.A., 182, 615.
Caporit, use of, for the disinfection of dairy utensils, 220.
Capsicum annuum, *C. frutescens*, see Chilli.
Carabid larva, *Cordyceps cinerea* on, in Sweden, 567.
Caralluma, *Triposporium stapeliae* on, in S. Africa, 764.
Caraway (*Carum carvi*), control of diseases of, 264.
Carbolic acid, use of, against *Plasmodiophora brassicae* on swedes, 710; against *Pythium de Baryanum* on cauliflower, 709; as a timber preservative, 411. (See also Phenol.)
Carbolineum, use of, against *Ganoderma applanatum* on oil palm, 80; against *Sclerotinia sclerotiorum* on tobacco, 730; against *Venturia inaequalis* on apple, 31, 297.
— Avenarius, use of, against *Venturia inaequalis* on apple, 31.
— plantarium, use of, against *Phytophthora parasitica* on orange, 213.
Carbololie I and II, use of, against *Pythium de Baryanum* on cauliflower, 709.
Carbon dioxide, effect of, on *Botrytis cinerea* on pear, strawberry, and vine, 102; on internal breakdown of apples, 35; on internal breakdown of pears, *Monilia* on plum, *Rhizopus nigricans* on strawberry, *Sclerotinia americana* on peach, and soft scald of apples, 102; on stone fruit rots in storage, 379.
— disulphide, toxicity of, to *Coniophora cerebella* and *Merulius lacrymans*, 261.
— —, use of, as a soil disinfectant, 42.
— tetrachloride, toxicity of, to *Sclerotinia americana*, 229.
Card process of timber preservation, 670.
Cargillineum B, use of, as a wound dressing for tea, 597.
Carica papaya, see Papaw.
Carnation (*Dianthus caryophyllus*), curly top of, in U.S.A., 446.
—, *Fusarium* on, in Greece, 470.

Carnegiea gigantea, *Bacterium tumefaciens* can infect, 358.
Carpinus caroliniana, *Aleurodiscus oakesii* on, in U.S.A., 601.
Carrichtera vella, *Plasmodiophora brassicae* on, in Russia, 346.
Carrot (*Daucus carota*), *Alternaria radicina* on, in Holland, 72.
—, *Armillaria mellea* on, in S. Australia, 142.
—, *Bacillus carotovorus* on, in Ceylon, 77; in U.S.A., 4.
—, *Botrytis cinerea* on, in U.S.A., 4.
—, *Cercospora carotae* on, in U.S.A., 356.
—, *Corticium solani* on, in Malaya, 355.
—, *Fusarium* on, in U.S.A., 4.
—, *Macrosporium carotae* on, in U.S.A., 356, 496.
—, *Penicillium*, *Rhizopus nigricans*, and *R. tritici* on, in U.S.A., 4.
—, *Sclerotinia sclerotiorum* on, in Bermuda, 421; in U.S.A., 4.
— yellows in U.S.A., 136; transmission of, to aster, 136.
Cartodere filum, possible use of, against *Ustilago nuda* on barley, in Belgium, 280.
Carya, see Hickory.
— *pecan*, see Pecan.
Caryota ochlandra, *Phyllosticta caryotae* on, in China, 725.
Casein as an adhesive, 286, 377.
— as a spreader, 107, 435.
—, presence of micro-organisms in sulphur fungicides containing, 107.
Cassava (*Manihot dulcis*, *M. palmata*, and *M. utilissima*), *Armillaria mellea* on, in Tanganyika, 552.
—, *Cercospora* on, list of species of, 137.
—, — *cassavae* on, in Madagascar, 352. (See also *Mycosphaerella manihotis* on.)
—, *Cercosporella* on, list of species of, 137.
—, die-back of, in Sierra Leone, 202, 553.
—, *Gloeosporium* on, in Sierra Leone, 202.
—, — *manihotis* on, in Madagascar, 352; in Réunion, 680.
—, leaf fall of, see die-back of.
— mosaic, control, 352; notes on, 202; occurrence in the Belgian Congo, 137; in Madagascar, 352; in Sierra Leone, 202, 553; transmission of, by *Bemisia mosaicivecta*, 137; by grafting, 202; by insects, 748; varietal resistance to, 553.
—, *Mycosphaerella manihotis* on, *Cercospora cassavae* imperfect stage of, 137; control, 137; occurrence in the Argentine and the Belgian Congo, 137; (?) in Tanganyika, 552; synonymy of, 137. (See also *Cercospora cassavae* on.)
—, *Phaeolus manihotis* on, in Madagascar, 352.
Cassia fistula, *Cercospora somalensis* on, in Italian Somaliland, 247.
— *floribunda*, *Macrophomina phaseoli* on, in Tanganyika, 201.
Castanea, see Chestnut.
Castor, see *Ricinus communis*.
Casuarina, *Rhizoctonia lamellifera* on, in Uganda, 727.
[*Casuarina*] *cunninghamiana*, *C. equisetifolia*, *C. glauca*, *C. muricata*, *C. quadrivalvis* and *C. stricta*, root nodules on, in India, 583; nitrogen assimilation by, 583.
Catacauma, species of, from the American tropics, 396.
Catechol in relation to resistance of onion to *Colletotrichum circinans*, 672.
Catenaria anguillulae on *Fasciola hepatica*, artificial cultivation of, 93.
Cattle, *Coccidioides* (?) *immitis* on, in U.S.A., 692.
—, *Rhinosporidium* (?) *seeberi* on, in India, 568.
—, 'sweet clover disease' of, moulds in relation to, in Canada, 699.
—, (?) *Trichophyton album* on, in Canada, 219.
Cattleya, reactivation of *Rhizoctonia repens* on, 583.
— *bowringiana*, *Rhizoctonia repens* from mycorrhiza of, nitrogen assimilation by, 649.
Cauliflower (*Brassica oleracea*), *Alternaria brassicae* on, influence of narcosis on susceptibility to, 45.
—, *Bacterium maculicola* on, in Japan, 554; in Tasmania, 271.
—, *Plasmodiophora brassicae* on, in Denmark, 608; in U.S.A., 355.
—, *Pythium de Baryanum* on, in Denmark, 709.
Cedrela odorata and *C. toona*, *Armillaria mellea* on, in S. Africa, 142.
Cedrus libani var. *deodara*, see Deodar.
Celery (*Apium graveolens*), *Bacterium apii* on, in U.S.A., 495.
—, *Cercospora apii* on, in Cyprus, 747; in U.S.A., 495.
— disease control, 264.
—, *Fusarium* on, in U.S.A., 357, 416.
— mosaic in U.S.A., 136; transmission of, by *Aphis gossypii*, 136; from *Commelina nudiflora*, 136.
—, *Protomyces inundatus* on, in Sweden, 330.
—, *Pythium* (?) *de Baryanum* on, in Sweden, 330.
—, *Sclerotinia sclerotiorum* on, in U.S.A., 292.
—, *Septoria apii* on, control, 233, 546, 743, 744; factors affecting, 196, 743, 747; losses caused by, 421; occurrence in Bermuda, 421; in Cyprus, 747; in England, 546; in Germany, 233, 747; in New Zealand, 744; in Switzerland, 743; in U.S.A., 196; studies on, 196, 743; varietal resistance to, 196, 743.
—, — *apii-graveolentis* on, in U.S.A., 196.
— yellows in U.S.A., 136; relation of, to aster yellows, 136; to yellows of *Helichrysum bracteatum* and *Zinnia elegans*, 446.
Cellulose, decomposition of, by *Coniophora cerebella*, *Merulius lacrymans*, and *Poria vaporaria*, 258; in plant materials in soil, 393.
Celosia cristata, curly top of beet affecting, in U.S.A., 446.

Celtis orientalis, *Ceratostomella ulmi* can infect, 665.
Cenangium abietis not a stage of *Brunchorstia destruens*, 667.
— *balsameum* renamed *Dermatea balsamea*, 131.
Centaurea, beet curly top virus can infect, 447.
Cephaleuros on coffee in Sierra Leone, 202.
— *mycoidea* on cacao, 207.
— (?) — on rose in the West Indies, 447.
— *parasiticus* on mango in Ceylon, 77.
— (?) — on rose in the West Indies, 447.
Cephalobus, *Anulosporium nematogenum* on, in U.S.A., 762.
— and *C. persignis*, fungi capturing, in U.S.A., 762.
Cephalosporium, effect of excretions of, on growth of wheat, 85.
— in soil in Czecho-Slovakia, 535.
— on coco-nut (copra) in Malaya, 355.
— on elm in U.S.A., 125, (?) 404.
— on *Fegatella conica* in Italy, 235.
— on man in Germany, 444; in U.S.A., 290.
— stage of *Ceratostomella ulmi*, 542.
— *acremonium*, effect of X-rays on, 644.
— — on maize in the Caucasus, 505.
— — f. *major* parasitizing *Penicillium crustaceum* in Italy, 537.
— *costantinii* on mushrooms in England, 72.
— *griseum* on man in France, 511.
— *lamellaecola* on mushrooms in England, 72.
— *pseudofermentum* on man in the West Indies, 174.
— *spinosum* on man in the Argentine, 695.
Ceratonia siliqua, *Cercospora ceratoniae*, *Ramularia australis*, and *Septoria ceratoniae* on, in Italy, 660.
Ceratostoma rugosa on timber in U.S.A., 669.
Ceratostomella on pine in Germany, 738; in Japan, 606.
— on timber, control, 344, 345, 411, 668; factors affecting, 344; losses caused by, 345; occurrence in Canada, 345, 545; in U.S.A., 344, 411, 668; study on, 344.
— *adiposum* on coco-nut (copra) in Malaya, 355.
— *coerulea*, heterothallism in, 650.
— *fagi* on beech, 665; in Germany, 195.
— *fimbriata*, homothallism in, 650.
— — on sweet potato in U.S.A., 463, 612.
— *ips* on pine in Japan, 606.
— *paradoxa*, action of certain volatile substances and gases on growth of, 46.
— — on banana, 39.
— — on coco-nut in India, 76.
— — on date palm in Tunis, 302.
— — on *Eleocharis tuberosa* and *Sagittaria sagittifolia* from China, 335.
— — on sugar-cane in Porto Rico, 114.
— *penicillata* on spruce, ascigerous stage of *Leptographium penicillatum*, 409; occurrence in Switzerland, 409; *Scopularia venusta* may be identical with, 409.
[*Ceratostomella*] *piceae* and *C. pini* on timber, action of, 195.
— *pluriannulata* on elm, 665.
— — on timber in U.S.A., 669.
— *quercus* on oak, 665; in Germany, 650.
— *stenoceras* on wood pulp in Norway, 69.
— *ulmi* can infect alder, beech, *Celtis orientalis*, lime, and oak, 665.
— — on elm, *Cephalosporium* stage of, 542; control, 194, 252, 334, 478, 542, 591, 666, 737, 795; decline of virulence of, in England, 126, 334; factors affecting, 194; heterothallism in, 126; host range of, 665; infection of wounds by, 665; legislation against, in Germany, 591; in Holland, 737; in S. Rhodesia, 399; losses caused by, 194; notes on, 194, 541; occurrence in Belgium, 478; in Bulgaria, 252; in England, 126, 334; in France, 194; in Germany, 578, 591; in Holland, 126, 478, 541, 665, 737; in Italy, 200, 334, 404, 541, 734; in Jugo-Slavia, 252; in Rumania, 666; in Switzerland, 194; in U.S.A., 252, 733, 794; pathogenicity of, 194, 542; perithecial formation in, 665; recovery from, 334; studies on, 126, 252, 404, 479, 541, 665, 666, 734; transmission of, by *Pteleobius vittatus*, 734; by *Scolytus*, 126, 252, 478, 734, 795; varietal susceptibility to, 126, 200, 404, 478, 665, 666, 734, 737.
— — on *Zelkova serrata* in Holland, 665.
Cercis canadensis, *Gloeodes pomigena* on, in U.S.A., 298.
Cercodeuterospora trichophila on pigeon pea in Italian Somaliland, 246.
Cercospora on begonia in Germany and N. America, 448.
— on cassava, list of species of, 137.
— on eggplant in Réunion, 680.
— on groundnut in U.S.A., 357.
— *apii* on celery in Cyprus, 747; in U.S.A., 495.
— *beticola* can infect *Chenopodium album*, *Rumex acetosella*, *R. altissimus*, *R. crispus*, and spinach, 269.
— — on beet, control, 135, 349, 416; effect of, on yield, 349, 549; note on, 676; occurrence in Austria, 135; in Belgium, 676; in Czecho-Slovakia, 546; in Rumania, 549; in Spain, 349, 416; study on, 349.
— *bloxami* on Chinese cabbage in U.S.A., 546.
— *cannabis* on hemp in China, 395.
— *cantuariensis* can infect bean, 263.
— *carotae* on carrot in U.S.A., 356.
— *cassavae* on cassava in Madagascar, 352; imperfect stage of *Mycosphaerella manihotis* (q.v.), 137.
— *ceratoniae* on *Ceratonia siliqua* in Italy, 660.
— *coffeicola* on coffee, factors affecting, 552; occurrence in Costa Rica, 168; in Sierra Leone, 553; in Tanganyika, 552.
— *cruciferarum* on radish in U.S.A., 546.

[*Cercospora*] *cruenta* on bean in China, 725.
— *daizu* on soy-bean in U.S.A., 612.
— *duddiae* on shallot and onion in Sierra Leone, [illegible].
— *fabae* on bean in England, 263.
— (?) — on vetch in Cyprus, 747.
— *italica* on *Eriodendron anfractuosum* in Italian Somaliland, 247.
— *kaki* on persimmon in China, 396.
— *kopkei* on banana from Jamaica and Brazil, 39.
— *longipes* on banana from Brazil, 39.
— — on sugar-cane in U.S.A., 467.
— *melongenae* on eggplant in Sierra Leone, 203.
— *melonis* on cucumber in Germany, 578.
— *musae* on banana in Fiji, 457; in Queensland, 456.
— — on plantain in Ceylon, 77.
— *nasturtii* on watercress in U.S.A., 546.
— *nicotianae* on tobacco, control, 118, 333, 476; factors affecting, 794; notes on, 11, 794; occurrence in China, 395; in Italian Somaliland, 247; in Java, 118; in Malaya, 355; in Rhodesi 476, 794; in Sumatra, 333; in Tanganyika, 201; (?) in U.S.A., 11; varietal susceptibility to, 333.
— *personata* on groundnut in China, 395.
— *rhododendri* on *Rhododendron ponticum* in U.S.A., 696.
— *rosicola* on rose in India, 612.
— *sesami* on sesame in Uganda, 422.
— — var. *somalensis* on sesame in Italian Somaliland, 247.
— *sissoo* on *Dalbergia sissoo* in India, 395.
— *somalensis* on *Cassia fistula* in Italian Somaliland, 247.
— *sorghi* on sorghum in China, 395.
— *stizolobii* on *Mucuna pruriens* in Sierra Leone, 203.
— *viticola* on vine in China, 395.
— *zebrina* can infect *Melilotus alba* var. *annua*, 269.
Cercosporella on cassava, list of species of, 137.
— *albomaculans* on Chinese cabbage and radish in U.S.A., 546.
— — on turnip in Belgium, 677; in U.S.A., 546.
— *herpotrichoides* can infect barley, 503.
— — on cereals, factors affecting, 279; occurrence in France, 157, 685; in U.S.A., 279; phenology of, 157; study on, 685.
— — on wheat, control, 560; factors affecting, 430, 560; occurrence in France, 75, 560; in Germany, 502; in U.S.A., 430; study on, 502.
Cercosporina ricinella on *Ricinus communis* in Italian Somaliland, 247.
Ceresan, composition of (American), 144.
—, cost of, 152.
—, determination of mercury in, 306; of mercury on seed-grain treated with, 152.
—, granosan English name for American brand of, 140.
[Ceresan], use of, against *Alternaria radicina* on carrot, 72; against bean diseases, 16; against *Calonectria graminicola* on rye, 16, 84, 152; against cereal diseases, 16; against *Fusarium* on rice, 720; against *F. bulbigenum* on narcissus, 225; against *Helminthosporium avenae* on oats, 163; against *H. gramineum* on barley, 16, 84, 152; against pea diseases, 16; against *Phoma lingam* on swedes, 140; against *Ustilago avenae* on oats, 84, 211, 144, 152; against *U. kolleri* on oats, 211; against *U. nigra* on barley, 161; against wheat bunt, 16, 84, 152.
— U. 564, short disinfection process for, 84.
— —, use of, against *Calonectria graminicola* on rye, *Helminthosporium gramineum* on barley, *Ustilago avenae* on oats, and wheat bunt, 84.
Ceretan (p. 16), see Ceresan.
Cereus grusonianus, *C. senilis*, and other spp., *Helminthosporium cactacearum* on, in Italy, 27.
Cerium nitrate, toxicity of, to *Mucor*, 693.
Cerotelium fici on fig in India, 551.
Ceuthospora (?) *phyllosticta* on pomegranate in Cyprus, 747.
Chaetodochium buxi on box, *Volutella buxi* renamed, 634.
— *rusci*, *Chaetostroma buxi* var. *rusci* renamed, 634.
Chaetomium on pulp wood in U.S.A., 545.
— *kunzeanum* on *Lolium multiflorum*, *L. perenne*, and *L. temulentum* as endophyte in Germany, 779.
Chaetophoma eriobotryae on loquat in Portugal, 726.
Chaetostroma buxi var. *rusci* renamed *Chaetodochium rusci*, 634.
Chaetothyrium muriformis on *Codiaeum variegatum* in the Philippines, 115.
Chamaecyparis formosensis, *Stereum sulcatum* on, in Japan, 605.
Chamaedaphne calyculata, *Chrysomyxa cassandrae* on, in U.S.A., 67.
Charlock (*Brassica sinapis*), *Phoma lingam* on, in Ireland, 483.
—, *Plasmodiophora brassicae* on, in Denmark, 608; in Russia, 346.
Cheese, *Penicillium bruno-violaceum* on, in Germany, 220.
—, — *puberulum* on, in New Zealand, 696.
Cheiranthus cheiri, see Wallflower.
Chenopodium album, *Cercospora beticola* can infect, 269.
Cherry (*Prunus avium* and *P. cerasus*), 'apoplexy' of, in Hungary, 227.
—, *Armillaria mellea* on, in England, 343.
—, *Clasterosporium carpophilum* on, in Switzerland, 314, 451.
—, *Coccomyces hiemalis* on, control, 11, 573, 614; occurrence in U.S.A., 11, 573, 614.
—, *Dibotryon morbosum* on, legislation against, in Bulgaria, 592; occurrence in Canada, 704.

[Cherry], *Fusarium oxysporum* on, in Greece, 469.
—, *Gloeosporium perennans* can infect, 299.
—, *Gnomonia erythrostoma* on, in Switzerland, 314.
—, gummosis of, in Germany, 180.
—, little leaf of, in U.S.A., 205.
—, *Neofabraea malicorticis* can infect, 299.
—, *Pholiota squarrosa* on, in England, 353.
—, *Sclerotinia cinerea* on, control, 99, 640; factors affecting, 99, 640; occurrence in Czecho-Slovakia, 640; in England, 99, 488; in Germany, 640; in Hungary, 640.
—, *Verticillium albo-atrum* on, in Germany, 117.
Cheshunt compound, use of, against fruit diseases, 42.
Chestnut (*Castanea*), *Cronartium quercuum* on, in China, 396.
—, *Endothia parasitica* on, breeding against, 601; legislation against, in Bulgaria, 592; in Portugal, 672; in S. Rhodesia, 399; loss of virulence of, 355; notes on, 355; occurrence in U.S.A., 205, 355, 601.
—, *Microsphaera alni* on, in China, 725.
—, *Phyllosticta maculiformis* on, in France, 252.
—, *Phytophthora cambivora* on, in England, 334; in U.S.A., 337.
—, *Pucciniastrum castaneae* on, in Japan, 726.
—, *Pythium* on, in Italy, 746.
—, resistance of timber of, to *Poria vaporaria*, 481.
Chick pea, see *Cicer arietinum*.
Chicory (*Cichorium intybus*), *Alternaria* on, in Cyprus, 747.
—, *Bacterium rhizogenes* on, effect of, on root formation, 554.
Chilli (*Capsicum annuum*), *Acrothecium capsici* on, in Porto Rico, 246.
—, *Alternaria* on, in Spain, 354.
—, *Bacterium solanacearum* can infect, 793; occurrence in Ceylon, 77.
—, *Botrytis cinerea* on, in U.S.A., 671.
—, *Brachysporium* on, in Japan, 584.
—, *Colletotrichum* on, in U.S.A., 357.
—, — *capsici* on, in Porto Rico, 246; in U.S.A., 357; synonym of *Steirochaete capsici*, 246.
—, — *nigrum* on, in China, 395.
—, fusariosis of, in Spain, 354.
—, *Fusarium annuum* on, in U.S.A., 748.
—, *Glomerella cingulata* on, in China, 724.
—, healthy potato virus can infect, 318.
—, 'little leaf' of, in Ceylon, 77.
— mosaic in Egypt, 749; in Spain, 354.
—, *Nematospora coryli* on, in U.S.A., 594.
—, *Oidiopsis* on, in Cyprus, 747.
—, *Peronospora hyoscyami* on, in U.S.A., 732.
—, *Phytophthora capsici* on, comparison of, with *P. parasitica*, 112; control, 496; losses caused by, 535; notes on, 535; occurrence in the Argentine, 535; in Porto Rico, 246; in U.S.A., 112, 496, (?) 732; study on, 112.
[Chilli], potato calico can infect, 615.
—, *Pythium ultimum* on, in U.S.A., 232.
—, *Stemphylium solani* on, in U.S.A., 60.
—, tobacco mosaic can infect, 119.
—, tomato mosaic and yellow mosaic can infect, 402.
—, — spotted wilt virus can infect, 59.
—, *Verticillium albo-atrum* can infect, 117.
—, virus disease of, and 'whitewash' of, in Spain, 354.
Chimonanthus fragrans, *Verticillium* on, in Italy, 338.
Chloral hydrate, toxicity of, to *Sclerotinia americana*, 229.
Chloride of lime, use of, against *Gloeodes pomigena* on orange, 759.
Chlorinated soda, toxicity of, to ringworm fungi, 509.
Chlorine, toxicity of, to *Coniophora cerebella* and *Merulius lacrymans*, 261.
—, use of, against moulds in citrus packing houses, 615.
Chlorochytrium rubrum on *Polygonum lapathifolium* in Sweden, 397.
Chloroform, effect of, on growth of *Trichoderma lignorum*, 46; on susceptibility of cauliflower to *Alternaria brassicae* and of bean to *Uromyces appendiculatus*, 45.
Chlorosis (non-parasitic) of rose in Italy, 373.
— of sugar-cane in British Guiana, 10; manganese deficiency in relation to, 11.
— of vine in France, 745.
—, banded, of sugar-cane in New S. Wales and Queensland, 329; cold chlorosis and sectional chlorosis synonyms of, 329.
—, infectious, of rose, in N. America, 447.
—, —, of *Sesamum radiatum* in Sierra Leone, 202.
—, striped, of maize in Italy, 746.
Chlorotic disease of hops in England, 242.
— streak of *Coix lacryma-jobi* in Hawaii, 722.
— — of sugar-cane, control, 245, 722; identical with 'fourth disease', 723; with pseudo-leaf scald, 723; with pseudo-streak, 245; occurrence in Hawaii, 245, 722; in Java, 245; in Porto Rico, 245, 723; in Queensland, 245; varietal susceptibility to, 245.
Chlorox, toxicity of, to ringworm fungi, 509.
Chlorphenolmercury, a constituent of uspulun-universal, 805.
Chlor-picrin, toxicity of, to *Coniophora cerebella* and *Merulius lacrymans*, 261.
—, use of, against *Bacterium tumefaciens* in soil, 516.
Cholodny's technique for the study of soil micro-organisms, 324, 785.
Chondroplea populea on poplar, conidial formation in, 790; *Cytosporella populi* and *Dothiorella populea* synonyms of, 790; *Dothichiza populea* renamed, 790.
Chromium content of triolith, 262.

Chrompik, composition of, and use of, against cereal smuts, 617; against wheat bunt, 559.
Chrysanthemum, *Bacterium tumefaciens* on, in England, 698; in Germany, 578.
—, beet curly top virus can infect, 447.
—, *Epicoccum chrysanthemi* on, in S. Africa, 764.
—, *Fusarium dianthi* on, in Belgium, 677.
—, injury to, by zinc sulphate resulting from burning sulphur in zinc painted glasshouses in England, 524.
—, *Oidium chrysanthemi* on, in Germany, 642.
—, *Puccinia chrysanthemi*, *Sclerotinia fuckeliana*, *Septoria chrysanthemi*, and *S. rostrupii* on, in Belgium, 677.
—, tomato spotted wilt affecting, in Great Britain, 730.
— *indicum*, *Phoma chrysanthemi* on, in Italy, 660.
— *morifolium*, *Verticillium albo-atrum* on, in Germany, 117.
Chrysomyxa alpina on *Rhododendron chrysanthemum* in Japan, 596.
— *cassandrae* on *Chamaedaphne calyculata* in U.S.A., 67.
— — on spruce in U.S.A., 67, 799.
— *expansa* on *Rhododendron degronianum* in Japan, 726.
— *ledi* and *C. ledicola* on *Ledum groenlandicum* in U.S.A., 67.
— — — — on spruce in U.S.A., 67, 799.
— *rhododendri* on spruce in Switzerland, 67.
Chytridiaceous fungus on *Euphrasia* in Italy, 309.
Cicadula sexnotata, transmission of yellows of aster by, in U.S.A., 136, 446; of yellows of *Helichrysum bracteatum* and *Zinnia elegans* by, in U.S.A., 446.
Cicadulina mbila, method of inoculating streak virus into, 686; transmission of maize streak by, 686; of sugar-cane streak by, in S. Africa, 659.
— *zeae*, method of inoculating streak virus into, 686; transmission of maize streak by, 687, 748.
Cicer arietinum, *Ascochyta rabiei* on, factors affecting, 265; not accepted as a name for *Phyllosticta rabiei*, 137; note on, 75; occurrence in France, 75; in India, 264; in Rumania, 549; study on, 265.
— —, *Helicobasidium purpureum* on, in Italy, 746.
— —, *Phyllosticta rabiei* on, see *Ascochyta rabiei* on.
Cichorium intybus, see Chicory.
Cinchona, *Gloeosporium*, and (?) *Nectria* on, in Indo-China, 147.
Cineraria, tomato spotted wilt affecting, in Great Britain, 730.
Cinnamomum camphora, see Camphor.
— *cassia*, *Exobasidium sawadae* on, in China, 724.
Cinnamon (*Cinnamomum dulce*), *Diplodia cinnamomi* on, in Portugal, 726.
Citral in relation to brown stain of orange, 566.
Citric acid, production of, by *Aspergillus niger*, 434.
Citrullus vulgaris, see Watermelon.
Citrus, *Alternaria* on, in Cyprus, 747.
—, *Bacterium citriputeale* on, in S. Australia, 141.
—, *Botrytis cinerea* on, in Sicily, 283.
—, cold storage spots of, in Italy, 746.
—, *Corticium salmonicolor* on, legislation against, in Italy, 565; occurrence in Queensland, 201.
—, — *solani* on, in U.S.A., 192.
—, *Deuterophoma tracheiphila* on, in Italy, 565.
—, *Diaporthe* on, in U.S.A., 495.
—, — *citri* on, control, 495; notes on, 495; occurrence in Brazil, Japan, Palestine, and S. Africa, 213; (?) in S. Australia, 141; in Spain, 213; in U.S.A., 213, 495; overwintering of, 495; perfect stage of *Phomopsis californica* and *P. citri*, 213.
— die-back in Egypt, 749.
—, *Diplodia* on, in Sierra Leone, 553.
—, — *natalensis* on, control, 20, 21, 506; factors affecting, 21; mixed inoculations with, 21; notes on, 506; occurrence in Cyprus, 506; in Palestine, 20, 21.
—, entomogenous fungi in control of insect pests of, in U.S.A., 567.
—, *Fusarium* on, in Sierra Leone, 553.
—, — *lateritium* and its var. *fructigenum* on, physiologic specialization in, 99.
—, *Gloeosporium* on, in Sierra Leone, 553.
—, — *limetticolum* on, legislation against, in Italy, 565; occurrence in Dominica, 21.
—, *Glomerella cingulata* on, in Italy, 746.
— gummosis, control, 494; occurrence in Ceylon, 77; in Egypt, 749; in U.S.A., 494.
—, hollow core of, in Italy, 746.
—, *Limacinia citri* on, in Italy, 746.
—, 'little leaf' of, in Palestine, 90; in U.S.A., 99.
—, *Macrophomina phaseoli* on, in Tanganyika, 201.
—, (?) 'mal secco' of, in Cyprus, 747.
—, *Oidium tingitaninum* on, in Ceylon, 689.
—, oleocellosis of, in Italy, 746.
—, *Oospora citri-aurantii* on, in Sierra Leone, 553.
—, *Penicillium digitatum* on, control, 34; mixed inoculations with, 21; occurrence in England, 34; in Palestine, 21.
—, — *italicum* on, in Palestine, 21.
—, *Phomopsis* on, in Sierra Leone, 553.
—, — *californica* and *P. citri* on, see *Diaporthe citri* on.
—, *Phytophthora citrophthora* on, control, 90, 212, 690; factors affecting, 367; notes on, 212, 367; occurrence in Italy, 565; in Porto Rico, 367; in U.S.A., 89, 212, 690.
—, — *hibernalis* on, in S. Australia, 141.
—, — *parasitica* on, control, 192; occurrence in Italy, 565; in U.S.A., 192, 212.

[*Citrus*], *Pleospora herbarum* on, in Cyprus, 747; in Italy, 746; (?) in S. Australia, 142.
—, *Pseudomonas citri* on, bacteriophage of, 551; control, 77, 433; factors affecting, 433; legislation against, in Italy, 565; in S. Rhodesia, 463; occurrence in Ceylon, 77, 433; in India, 551; in Japan, 554; in U.S.A., 433; varietal resistance to, 433.
—, psorosis of, control, 89, 494; factors affecting, 89; note on, 142; occurrence in S. Africa, 142; in U.S.A., 89, 494; two types of, 89.
—, *Pythium* on, in U.S.A., 192.
—, *Rhizoctonia lamellifera* on, in Rhodesia, 727.
—, *Rhizopus* on, in U.S.A., 192.
—, root rot of, in Palestine, 368.
—, scaly bark of, in S. Africa, see psorosis of.
—, *Sclerotinia* on, in Italy, 758.
—, — *fuckeliana* on, in Italy, 746.
—, — *sclerotiorum* on, in Italy, 746.
—, *Sclerotium rolfsii* on, in U.S.A., 192.
—, *Septoria citri* var. *minor* on, in Italy, 746.
—, *Sphaceloma fawcettii* on, see *Sporotrichum citri*.
—, *Sphaeropsis tumefaciens* on, legislation against, in Italy, 565.
—, *Sporotrichum citri* on, control, 166, 495; chemical factors in susceptibility to, 166; historical records of, 625; note on, 202; occurrence in Africa, Asia, Australia, and Panama Canal Zone, 626; in Dominica, 21; in Jamaica, 166; in Mexico, New Zealand, and Oceania, 626; in Porto Rico, 166; in Sierra Leone, 202; in S. America, 626; in U.S.A., 495; in W. Indies, 626; specific and varietal resistance to, 166, 202.
—, spotting (non-parasitic) of, in Italy, 746.
—, yeasts on, in Sierra Leone, 553.
— *aurantifolia*, see Lime.
— *aurantium*, see Orange.
— *bigaradia*, see Orange.
— *decumana*, see Grapefruit.
— *grandis*, see Grapefruit.
— *limonum*, see Lemon.
— *medica*, see Lime.
— *mitis*, *Oidium tingitaninum* on, in Ceylon, 167.
— *nobilis*, see Orange.
— *sinensis*, see Orange.
Cladosporium imperfect stage of *Mycosphaerella tulasnei*, 301.
— in air of apple orchards in England, 32.
— in soil in Austria, 191; in Siberia, 191; in U.S.A., 71; relation of, to *Fusarium orthoceras* var. *pisi* on peas, 71.
— on apple in England, 32.
— on avocado pear in Brazil, 707.
— on *Lolium italicum* in England, 32.
— on *Passiflora edulis* in Queensland, 40.
— — — *herbertiana* in Queensland, 41.
— on pulp wood in U.S.A., 545.
[*Cladosporium*] on timber in U.S.A., 669.
— *carpophilum* on peach, control, 11, 573, 709; occurrence in U.S.A., 11, 573, 709.
— *cucumerinum* on cucumber in Holland, 485.
— *effusum* on pecan in U.S.A., 709, 798.
— *fulvum* on tomato, *Botrytis* parasitizing, 194, 713; control, 123, 194, 233, 403, 732; factors affecting, 403; genetics of resistance to, 250; note on, 179; occurrence in England, 403; in Germany, 123, 194, 233, 250, 578, 732; in Jersey, 549; in New Zealand, 122; in U.S.A., 249; study on, 250; varietal resistance to, 249, 251.
— —, osmotic capacity of, in relation to germination, and to parasitism of *Botrytis* to, 713.
— —, toxicity of fungicides to, 194; of hydrophilic colloidal sulphur to, 356.
— *herbarum*, decomposition of rape cake by, 593.
— — in air at wood pulp mills in Norway, 69.
— — on banana, 39.
— — on plum in Austria, 575.
— —, osmotic capacity of, in relation to germination, 713.
— *mansoni* synonym of *Sporotrichum mansoni*, 246.
— *metaniger* on man, 219; *Cryptococcus metaniger* renamed, 219.
— *miyaki* synonym of *C. oryzae*, 147.
— *oryzae* on rice in Indo-China, 146.
Clasterosporium on apple in U.S.A., 378.
— on rice in Indo-China, 146.
— *carpophilum* on apricot in France, 301.
— — on cherry in Switzerland, 314, 451.
— — on plum in Switzerland, 314.
— — on stone fruits in France, 301; in Hungary, 575.
— *lindavianum* on maize in Tanganyika, 552.
Clathrosorus synonym of *Plasmodiophora*, 468.
— *campanulae* renamed *Spongospora campanulae*, 468.
Claviceps on *Lolium italicum*, *Epicoccum granulatum* parasitizing, in England, 32.
— *microcephala* in seed samples of *Agrostis stolonifera*, *Poa pratensis*, and *P. trivialis* in Denmark, 294.
— *purpurea* in seed samples of grasses in Denmark, 294.
— — on rye, ergotism due to, in England, Germany, and Russia, 88.
— — on wheat in France, 275.
Clitocybe dealbata in mushroom beds in England and France, 611.
(?) — *tabescens* on pineapple pear in U.S.A., 680.
Clover (*Trifolium*), *Aplanobacter insidiosum* on, in Russia, 571.
—, bean mosaic can infect, 614.
, *Erysiphe polygoni* on, breeding against, 78; note on, 615; occurrence in U.S.A., 78, 207, 615; physiologic

forms of, 207 ; strain resistance to, 207.
[Clover], *Kabatiella caulivora* on, in U.S.A., 11, 78.
—, mosaic of, in U.S.A., 414, 741 ; transmission of, to beans, 414, 741 ; to peas and sweet peas, 741 ; types of, 741.
—, *Ophiobolus graminis* can infect, 19.
—, *Plenodomus meliloti* on, in Canada, 635.
—, reclamation disease of, in Denmark, 656.
—, *Sclerotinia trifoliorum* and *Typhula trifolii* in seed samples of, in Denmark, 294.
Cobalt chloride and nitrate, toxicity of, to *Mucor*, 693.
Coccidiaceae, new family of the Chytridineae, 171.
—, new family of the Endomycetales, 170.
Coccidioides, taxonomy of, 170, 171.
— *asferiformis*, *C. brasiliensis* synonym of, 170.
— *immitis*, life-history of, 171.
— (?) on cattle in U.S.A., 692.
— — on the dog in U.S.A., 288.
— — on man, formation of endospores by, 440 ; occurrence in N. America, 171 ; in U.S.A., 170, 288 ; *Pseudococcidioides mazzai* synonym of, 440 ; renamed *Geotrichum immite*, 171 ; studies on, 170, 171, 440 ; systematic position of, 170, 171 ; transference of, to *Blastomycoides* not accepted, 170.
Coccids, see Scale insects.
Coccomyces hiemalis on cherry in U.S.A., 11, 573, 614.
Cochlearia armoracia, see Horse-radish.
— *danica*, *Plasmodiophora brassicae* on, in Russia, 846.
Coco-nut (*Cocos nucifera*), *Aspergillus* on copra from, 47 ; in Malaya, 355 ; lipase production by, 47.
—, *Botryodiplodia theobromae* on, in Indo-China, 148.
—, bronze leaf wilt of, in Jamaica, 90 ; in Trinidad, 143.
—, *Cephalosporium* on copra from, in Malaya, 335.
—, *Ceratostomella adiposum* on copra from, in Malaya, 855.
—, — *paradoxa* on, in India, 76.
—, *Colletotrichum* and *Diplodia* on copra from, in Malaya, 355.
—, *Ganoderma lucidum* on, in India, 76 ; in the Seychelles, 144.
—, *Gloeosporium* on, in Indo-China, 148.
—, lightning injury of, in Malaya, 506.
—, *Marasmius palmivorus* on, in Malaya, 507.
—, *Mucor racemosus* and *Penicillium* on copra from, lipase production by, 47.
—, *Penicillium glaucum* on copra from, in Malaya, 355.
—, *Phytophthora palmivora* on, control of, by eradication, 435 ; occurrence in Ceylon, 77 ; in Surinam, 435.
[Coco-nut], *Rhizopus* (?) *nigricans* on copra from, in Malaya, 355.
—, *Syncephalastrum cinereum* on copra from, lipase production by, 47.
—, *Trichothecium roseum* on copra from, in Malaya, 355.
Cocos australis, *Rosellinia*-like Ascomycete on, in U.S.A., 79.
— *nucifera*, see Coco-nut.
— *plumosa*, *Dothiorella* and *Phomopsis* on, in U.S.A., 79.
Codex sulphur, use of, against wheat rusts, 151.
Codiaeum variegatum, *Chaetothyrium muriformis* on, in the Philippines, 115.
Coemansia in soil in Austria, 191.
Coffee (*Coffea*), *Armillaria mellea* on, in the Belgian Congo, 760 ; in Tanganyika, 201 ; in Uganda, 422.
—, *Ascochyta* on, in Eritrea, 746.
—, *Bacillus coffeicola* on, in the Belgian Congo, 91.
—, black bean disease of, in India, 22.
—, *Cephaleuros* on, in Sierra Leone, 202.
—, *Cercospora coffeicola* on, factors affecting, 552 ; occurrence in Costa Rica, 168 ; in Sierra Leone, 553 ; in Tanganyika, 552.
—, *Corticium koleroga* on, control, 435, 436 ; factors affecting, 436 ; note on, 76 ; occurrence in India, 76, 435, 436.
—, — *solani* on, in Java, 760.
—, die-back of, in India, 435 ; in Uganda, 422.
— diseases, geographical distribution of, 168 ; occurrence in the Belgian Congo, 760.
—, dying-off (non-parasitic) of, in Costa Rica and Portuguese W. Africa, 168, 761 ; 'yellowing' of, in Kenya identical with, 761.
—, *Fomes lignosus* on, in the Belgian Congo, 80 ; (?) in the Ivory Coast, 91.
—, — *noxius* on, in India, 435 ; in Java, 286.
—, *Fusarium* on, in Indo-China, 148.
—, (?) *Ganoderma applanatum* on, in India, 285.
—, *Gibberella moniliformis* on, in Porto Rico, 246.
—, *Glomerella cingulata* on, note on, 8 ; occurrence in the Belgian Congo, 760 ; in Java, 760 ; in Kenya, 8 ; saltation in, 8 ; strains of, 8.
—, *Hemileia vastatrix* on, control, 286, 435, 436, 552 ; factors affecting, 285, 436 ; incubation period of, 285 ; notes on, 169, 436 ; occurrence in India, 285, 435, 436 ; in S. Africa, 142, 169 ; in Tanganyika, 552 ; study on, 285 ; varietal susceptibility to, 142.
—, 'jeloo' disease of, see black bean disease of.
—, leaf crinkle of, in the Belgian Congo, 691.
—, *Nectria anisophila* on, in Costa Rica, 437 ; *Fusarium anisophilum*, imperfect stage of, 437.
—, *Nematospora coryli* on, in Kenya, 8 ; *Antestia lineaticollis* in relation to, 8.

[Coffee], obscure disease of, in the Belgian Congo, 80.
—, *Omphalia flavida* on, in Costa Rica, 168.
—, phloem necrosis of, 43. (See also *Phytomonas leptovasorum* on.)
—, *Phytomonas leptovasorum* on, in Surinam, 435; *Rhizoecus coffeae* and other insects in relation to, 435. (See also phloem necrosis of.)
—, (?) *Poria hypolateritia* on, in India, 285.
—, *Rhizoctonia* on, in Java, 286.
—, — *lamellifera* on, in Uganda, 727.
—, *Rosellinia* on, in Costa Rica, 168; in India, 435.
—, withering of tips of, in Eritrea, 746.
—, 'yellowing' of, in Kenya considered identical with dying-off of, in Portuguese W. Africa, 761.
Coix lacryma-jobi, chlorotic streak of, in Hawaii, 722.
— —, streak disease of, in Réunion, 328; transmission of, by *Aphis maydis* to sugar-cane, 328.
Cold chlorosis of sugar-cane in the Argentine, 786. (See also Banded chlorosis of.)
— storage spot of grapefruit and orange in U.S.A., 565.
— — spots of citrus in Italy, 746.
Coleosporium begoniae on begonia in Italy and Mexico, 448.
Collar rot of lime and orange in Dominica, 21.
Colletotrichum on *Agropyron repens* in Canada, 621.
— on *Aristolochia bracteata* in India, 267.
— on avocado pear in Sierra Leone, 553.
— on cacao in the Belgian Congo, 80.
— on chilli in U.S.A., 357.
— on coco-nut (copra) in Malaya, 355.
— on cotton in India, 267.
— on *Hibiscus diversifolius* in India, 267.
— on *Phaseolus* and *Vigna* in Uganda, 422.
— *allescheri* on palm in Belgium, 7.
— *ampelinum* var. *parthenocissi* on Virginia creeper in China, 725.
— *atramentarium* on potato in Belgium, 676.
— *capsici* on chilli in Porto Rico, 246; in U.S.A., 357; synonym of *Steirochaete capsici*, 246.
— *circinans* on onion, catechol and protocatechuic acid in relation to resistance to, 672; occurrence in S. Australia, 142; in U.S.A., 672.
— *dematium* on banana, 39.
— *falcatum* on banana from Brazil, 39.
— — on sugar-cane in U.S.A., 679, 724.
— *fragariae* on strawberry in U.S.A., 495.
— *gloeosporioides* on grapefruit and lemon in India, 369.
— — on lime, method of infection by, 566; occurrence in India, 369.
— — on orange in India, 369.
— *graminicolum* on sorghum in India, 212.
[*Colletotrichum*] *higginsianum* on crucifers in U.S.A., 546.
— *lagenarium* on watermelon in France, 418; synonymy of, 418.
— *lindemuthianum* on bean, control, 1, 71; factors affecting, 671; occurrence in Réunion, 680; in U.S.A., 1, 71, 671; varietal resistance to, 71.
— *lini* on flax in Austria and Canada, 220; in Holland, 220, 372; in Russia and U.S.A., 220; *Gloeosporium lini* and *C. linicolum* synonyms of, 220; study on, 221.
— *linicolum* synonym of *C. lini*, 220.
— *necator* on pepper in India, 267.
— *nigrum*, antagonism of bacteria to, 109.
— — on chilli in China, 395.
— —, see also *Glomerella cingulata*.
— *oligochaetum* synonym of *C. lagenarium*, 418.
— *phomoides* on tomato in U.S.A., 121.
— *pisi* on peas in U.S.A., 355.
— *zeae* on maize in the Caucasus, 505.
— *zingiberis* on ginger in Ceylon, 77; in Trinidad, 434.
Colloidal clay as a wetting agent, 182.
— copper, preparation of, 391.
— —, use of, against *Phytophthora infestans* on potato, 391.
— —, see also Bouisol.
— copper hydroxide, use of, against fruit diseases in New Zealand, 42.
— cresylic acid, preparation of, and use of, with lime-sulphur, 711.
— sulphur, use of, against *Cladosporium fulvum* on tomato, 123; against *Coccomyces hiemalis* on cherry, 614; against *Puccinia glumarum* and *P. triticina* on wheat, 151; against *Sclerotinia americana* on peach, 145; against *Venturia inaequalis* on apple, 30, 614; against *V. pirina* on pear, 639.
— —, see also Sulphur, flotation; Sulsol.
— —, hydrophilic, preparation of, 460.
— —, —, toxicity of, to *Cladosporium fulvum*, *Glomerella cingulata*, *Mycosphaerella pomi*, and *Sclerotinia cinerea*, 356.
— —, —, use of, as a fungicide, 460.
Collybia velutipes, necrotic effect of, on phloem of lime, 44.
Colocasia esculenta, *Phytophthora colocasiae* on, in China, 724.
Commelina nudiflora, eradication of, for control of celery mosaic in U.S.A., 136.
Coniella granati on pomegranate in Cyprus, 747.
Conifers, *Armillaria mellea* on, in Germany, 739.
—, *Botrytis cinerea* on, in Czecho-Slovakia, 340.
—, damping-off of, in U.S.A., 269.
—, *Diaporthe eres* on, in Great Britain, 595.
—, diseases of, in Germany, 478; legislation against, in Italy, 528.
—, Hypodermataceae on, in Canada and U.S.A., 254.

[Conifers], *Hypodermella* and *Lophodermium* on, in Switzerland, 314.
—, mycorrhiza of, in Great Britain, 183; *Elaphomyces* forming, in Scotland, 529.
—, *Rhabdocline pseudotsugae* on, legislation against, in Italy, 528.
—, *Rhizina undulata* on, in France, 798; in Poland, 550.
—, *Stereum sulcatum* on, in N. America, 605.
Coniophora cerebella on timber, control, 260, 261, 262, 345; factors affecting, 260, 261; identification of, in the sterile stage, 259; mixed inoculations with, 260; occurrence (?) in Australia, 345; in Russia, 258, 259, 260, 261; production of water by, from wood cellulose, 258; studies on, 258, 259.
Coniosporium corticale causing asthma in man in U.S.A., 174.
— — on *Acer*, basswood, and hickory in U.S.A., 174.
— *shiraianum* on bamboo in Portugal, 726.
Conio rium on elm in U.S.A., 124.
— *abutilonis* on *Abutilon avicennae* in Russia, 632.
— *boehmeriae* on *Boehmeria nivea* in Russia, 632.
— *concentricum* on *Yucca filamentosa* in Rumania, 550.
— *diplodiella* on vine in Rumania, 486; in Switzerland, 8.
— *ulmi* on elm in U.S.A., 124.
— *wernsdorffiae* on rose in U.S.A., 205, 633.
Copodust, composition of, and use of, against *Pseudoperonospora humuli* on hops, 325.
Copper, estimation of, in plant protectives, 708.
—, solubility of, in Bordeaux and Burgundy mixtures, 710.
— acetate in relation to cyanide injury, 690.
— — spray injury, 358.
— —, toxicity of, to *Mucor*, 693.
— —, use of, against *Clasterosporium carpophilum* and *Sclerotinia cinerea* on apricot, 301; against fruit diseases, 42.
— aceto-arsenate, use of, as a timber preservative, 740.
— arsenite, use of, against *Puccinia* spp. on wheat, 272; as a timber preservative, 740.
— borate, use of, as a timber preservative, 740.
— carbonate in relation to cyanide injury, 690.
— — seed injury, 212.
— — spray injury, 29.
— —, use of, against cereal smuts, 617; against diamond canker of plum, 180; against *Phytophthora parasitica* var. *nicotianae* on tobacco, 402; against *Puccinia* spp. on wheat, 272; against *Pythium de Baryanum* on tobacco, 402; against *P. ultimum* on cabbage, chilli, and eggplant, 232; on tomato, 122, 232; against *Sorosporium reilianum* on maize, 563.
[Copper carbonate], ammoniacal, use of, against *Sclerotium rolfsii* on apple, 377.
— chloride, effect of, on assimilation of wheat leaves, 383.
— —, toxicity of, to *Mucor* spp., 693; to *Sclerotinia cinerea* and *Trichothecium roseum*, 523.
— —, see also Cupric, Cuprous chlorides.
—, colloidal, see Colloidal copper.
— compounds, fungicidal action of, on *Plasmopara viticola*, 674.
— —, use of, against fruit diseases, 41; in soil disinfection, 42.
— dust A B, use of, against wheat bunt, 559.
— hydroxide, colloidal, see Colloidal copper hydroxide.
— -lime dust, injury caused by, 42.
— — —, use of, in Germany, 31; in S. Africa, 380; in U.S.A., 5, 11, 206, 240, 494, 613, 654, 798.
— — —, Wacker's, 74.
— nitrate, use of, against reclamation disease of cereals, 86.
— oxide, use of, as dust or spray against fruit diseases, 709.
— —, red, as a constituent of cuprite, 232.
— —, —, use of, against *Pythium ultimum* on cabbage, chilli, eggplant, and tomato, 232; against *Septoria lycopersici* on tomato and *Botrytis* on lily, 233.
— — ammonia, a constituent of segetan nassbeize, 306.
— oxychloride, use of, against *Fusarium conglutinans* var. *callistephi* on China aster, 374; against *Helminthosporium cactacearum* on *Cereus* spp., 27.
— phosphate, use of, as dust or spray against fruit diseases, 709.
— resinate, use of, as a fungicide, 182.
— silicate, use of, as dust or spray against fruit diseases, 709.
— salicylate, toxicity of, to *Sclerotinia cinerea* and *Trichothecium roseum*, 523.
— salt of oxyquinoline, use of, against *Plasmopara viticola* on vine, 74.
— sprays, adhesiveness of, estimation of, 139.
— —, wetting capacity of, estimation of, 138.
— stearate, use of, against *Pythium de Baryanum* on tobacco, 402.
— sulphate a constituent of 'Saatbeize für Roggen', 306; of weizenfusariol, 305.
— —, anhydrous, use of, against *Pythium ultimum* on tomato, 122.
— — applications to roots against *Fomes lignosus* on *Hevea* rubber, 54, 55.
— —, basic, spray injury caused by, 29.
— —, injury caused by, to seed-grain, 212.
— —, monohydrated, a constituent of copodust, 325.
— —, —, use of, against *Cladosporium*

effusum and *Leptothyrium nervisedum* on pecan, 798; against *Phytophthora infestans* on potato, 613; against *Pythium ultimum* on cabbage, chilli, and egg-plant, 232; on tomato, 122, 232.
[Copper sulphate] soil treatment against reclamation disease of barley, beans, clover, lucerne, oats, peas, and swedes, 656; of cereals, 86; against *Sclerotium rolfsii* on apple, 377; in relation to cyanide injury, 690.
— —, toxicity of, to *Gibberella fujikuroi*, 533; to *Mucor*, 693; to *Ophiobolus miyabeanus* and *Piricularia oryzae*, 533; to *Sclerospora graminicola*, 625; to *Sclerotinia americana*, 710.
— —, use of, as a soil disinfectant, 267; as a timber preservative, 123.
— — and caustic soda, use of, against *Phytophthora infestans* on potato, 110.
Copra, see Coco-nut.
Coprinus lagopus, diploidization in, 186.
Corallorrhiza innata, mycorrhizal endophyte of, nitrogen assimilation by, 649.
Corchorus, see Jute.
Cordyceps cinerea on a Carabid larva in Sweden, 567.
— *clavulata* on a coccid in Sweden, 567.
— *militaris*, *Melanospora parasitica* on, in Great Britain, 216.
— — on *Phalera bucephala* in Denmark and Sweden, 567.
— *sphingium* on a Noctuid in Sweden, 567.
Corethrostroma laricis on larch, conidial formation in, 790.
'Cork' spot of apple and pear in U.S.A., 769.
Cornus alternifolia and *C. rugosa*, *Gloeodes pomigena* on, in U.S.A., 298.
Correa, mycorrhiza of, in New S. Wales, 811.
Corticium on cacao in the Belgian Congo, 80.
(?) — on rice in Indo-China, 147.
— *anceps* on *Pteridium aquilinum* in Ireland and Scotland, 132; *Tulasnella anceps* renamed, 132.
— *centrifugum* on gooseberry in Belgium, 8.
— *koleroga* on bamboo in India, 76.
— — on coffee, control, 435, 436; factors affecting, 436; note on, 76; occurrence in India, 76, 435, 436.
— *salmonicolor* on cacao, 207.
— — on citrus, legislation against, in Italy, 565; occurrence in Queensland, 201.
— — on mango in Ceylon, 77.
— — on orange in Kenya, 9.
— *sasakii*, hyphal fusions in, 331.
— — on beans and camphor in Japan, 331.
— — on cotton in India, 331.
— — on cowpea, groundnut, rice, and sugar-cane in Japan, 331.
— *solani*, hyphal fusions in, 331.
— — on aster (China), in S. Africa, 175.
[*Corticium solani*] on barley in S. Australia, 159.
— — on bean in U.S.A., 133, 671.
— — on beet in U.S.A., 133.
— — on begonia in Germany, 448.
— — on *Brassica chinensis*, influence of nutrition on virulence of, 780.
— — on cabbage in U.S.A., 133.
— — on carrot in Malaya, 355.
— — on citrus in U.S.A., 192.
— — on coffee in Java, 760.
— — on cotton, 566.
— — on crucifers in U.S.A., 546.
— — on cucumber in Denmark, 709.
— — on *Cynodon dactylon* in Malaya, 355.
— — on ginger in Ceylon, 77.
— — on grasses in Holland, 781; in S. Australia, 159.
— — on lettuce in U.S.A., 133.
— (?) — on lupin in U.S.A., 96.
— — on maize in Sierra Leone, 203.
— — on oats in S. Australia, 159.
— — on orange in Italy, 214.
— — on peas, control, 609; effect of, on pea size, 671; occurrence in U.S.A., 133, 412, 609, 671.
— — on pigeon pea in Sierra Leone, 203.
— — on potato, antagonism of bacteria to, 109; control, 110, 389, 391, 530, 613, 651, 652, 719, 785; factors affecting, 159, 187, 785; hyphal fusions in, 331; notes on, 159, 186, 676; occurrence in Austria, 186; in Belgium, 676; in Canada, 530; in Denmark, 715; in Germany, 331, 719; in S. Australia, 159; in U.S.A., 133, 389, 391, 613, 651, 652; in Victoria, 110; study on, 530; varietal susceptibility to, 716.
— — on *Rhododendron carolineanum* and *R. ponticum* in U.S.A., 697.
— — on strawberry in France, 489.
— — on swedes, immunization against, 262.
— — on tomato, control, 643; occurrence in Bermuda, 421; in U.S.A., 121, 643.
— — on turf in U.S.A., 450.
— — on wheat in S. Australia, 159.
— —, specialization in, 133.
— —, translocation of protoplasm in, 776.
— —, *Trichoderma lignorum* parasitizing, 192.
— *stevensii* on cacao, 207.
Cortinarius mucosus forming mycorrhiza on larch and pine in Britain, 183.
Corylus rostrata var. *sieboldiana*, *Puccinia-strum coryli* on, in Japan, 726.
Corynebacterium diphtheriae, toxicity of products of *Penicillium* to, 387.
Coryneum feijoae on *Feijoa sellowiana* in Italy, 293.
— *myristicae* on nutmeg in Java, 425.
Cosmic rays, effect of, on gall formation by *Bacterium tumefaciens*, 680.
Cosmos, beet curly top virus can infect, 441.
Cotton (*Gossypium*), (?) *Ascochyta gossypii* on, in Queensland, 200.

[Cotton] bacteriosis in the Caucasus, 507.
—, *Bacterium malvacearum* on, control, 91, 421, 439; dissemination of, 92, 421; dissociation of, 141; factors affecting, 22, 92, 141, 421, 508, 775; internal infection of seed by, 141; notes on, 421, 566; occurrence in the Caucasus, 507; in Eritrea, 746; in Fiji, 439; in Japan, 554; in Rhodesia, 775; in the Sudan, 91, 439; in Uganda, 421, 439; phenology of, 507; strains of, 141; studies on, 22, 91, 421, 507; transmission of, to *Eriodendron anfractuosum*, 170; varietal resistance to, 439, 507.
—, *Botryodiplodia theobromae* on, in Uganda, 422.
—, *Colletotrichum* on, in India, 267.
—, *Corticium sasakii* on, in India, 331.
—, — *solani* on, 566.
—, *Diplodia tubericola* can infect, 366.
—, *Eremothecium cymbalariae* on, 566.
—, *Fusarium* on, 566; in India, 567.
—, — *angustum* and *F. orthoceras* on, in Egypt, 286.
—, — *vasinfectum* on, breeding against, 508; factors affecting, 439, 567, 714; notes on, 93; occurrence in India, 439, 508, 566; in U.S.A., 92; physiologic forms of, 567; study on, 714; toxic action of, 315, 387, 714; varietal resistance to, 508, 566.
—, — — var. *inodoratum* on, in Egypt, 286.
—, *Glomerella gossypii* on, 566; in China, 395.
—, *Nematospora* on, in Nyasaland, 439; transmission of, by *Dysdercus*, 439.
—, — *coryli* on, 566; factors affecting, 775; occurrence in Rhodesia, 775; in S. Africa, 438; transmission of, by *Callidea dregei*, *Dysdercus*, and Heteroptera, 439.
—, — *gossypii* on, 566; in S. Africa, 438; transmission of, by *Callidea dregei*, *Dysdercus*, and Heteroptera, 439.
—, — *nagpuri* on, 566.
—, *Ozonium texanum* on, in U.S.A., 440.
—, *Pestalozzia gossypii* on, in China, 395.
—, *Phymatotrichum omnivorum* on, 566; control, 287, 628; effect of anaerobic conditions on, 216; of plant extracts on growth of, 691; occurrence in U.S.A., 216, 270, 287, 516, 627, 628, 691; overwintering of, 628; persistent strands of, 628; sclerotial formation in, 287, 627; studies on, 216, 287, 627, 628, 691; varietal resistance to, 270.
—, *Physalospora rhodina* and *P. zeicola* can infect, 366.
—, 'red leaf' disease and root rot of, in India, 567.
—, *Sclerotium rolfsii* on, in India, 551.
—, *Spermophthora gossypii* on, 566.
—, *Verticillium* on, in Queensland, 200.
—, — *albo-atrum* can infect, 117; notes on, 566; occurrence in U.S.A., 92; study on, 93.
—, — *dahliae* can infect, 470.
Cottonwood (*Populus*), *Cytospora* can infect, 270.
—, *Phymatotrichum omnivorum* on, in U.S.A., 516.
—, *Valsa nivea* on, in U.S.A., 270.
Court-noué of vine, legislation against, in Portugal, 672. (See also Leaf roll of.)
Cowpea (*Vigna sinensis*), *Aristastoma concentrica* on, in U.S.A., 788.
—, *Corticium sasakii* on, in Japan, 331.
—, tobacco ring spot can infect, 121.
—, *Uromyces vignae* on, in China, 395; in Cyprus, 747.
Cranberry (*Vaccinium*), false blossom of, in U.S.A., 706; transmission of, by *Euscelis striatulus*, 706.
—, fruit rots of, in U.S.A., 231.
—, *Sclerotinia oxycocci* on, in U.S.A., 205.
Crataegus, *Bacillus amylovorus* on, in Canada, 452.
—, *Gloeosporium perennans* and *Neofabraea malicorticis* can infect, 299.
— *arnoldiana*, *C. beata*, and *C. brainerdi*, *Gymnosporangium germinale* can infect, 704.
— *crus-galli*, *Gloeodes pomigena* on, in U.S.A., 206.
— *cuneata*, *Podosphaera oxyacanthae* on, in China, 396.
— *filipes* and *C. holmesiana*, *Gymnosporangium germinale* can infect, 704.
— *mollis*, *Gloeodes pomigena* on, in U.S.A., 206.
— *oxyacantha*, *Bacillus amylovorus* on, in U.S.A., 766.
— —, *Gymnosporangium germinale* can infect, 704.
— *punctata*, *Bacillus amylovorus* on, in U.S.A., 766.
— *tomentosa*, *Gymnosporangium germinale* can infect, 704.
Cream, fungi in, in Ireland, 440; in U.S.A., 219.
—, *Phoma hibernica* in, in Irish Free State, 24.
Creasing of orange in Italy, 746.
Creosote, use of, as a timber preservative, 1, 70, 123, 261, 342, 343, 344, 345, 670, 740. (See also Tar.)
— -petroleum mixture, use of, as a timber preservative, 670.
Cresylic acid oil emulsion sprays, combination of, with fungicides, 711.
Cribropeltis citrullina on watermelon in U.S.A., 788.
Cricotopus, *Stachylina longa* on, in Alpine waters, 512.
Crinkle of orange in S. Australia, 142.
— of potato in Ireland, 717; in Poland, 716; relation of, to potato mild mosaic (American), 48; to potato mosaic, 717; to virus A, 717; transmission of, by *Myzus persicae*, 717; varietal susceptibility to, 716.
— A of potato, relation of, to 'healthy potato virus' and tobacco vein-banding, 588.
— of tobacco in Rumania, 791.
Cronartium comptoniae on pine in Canada, *Tuberculina maxima* parasitizing, 548.

[*Cronartium*] *quercuum* on chestnut, oak, and pine in China, 396.
— *ribicola* on currant, legislation against, in U.S.A., 381; occurrence in U.S.A., 407; virulence of, to pine, 407.
— — on gooseberry, 381; in Canada, 480.
— — on pine, control, 480, 604, 739; fertilization in, 668; field inoculations with, 407; legislation against, in U.S.A., 381, 400; method of determining age of infection by, 603; notes on, 480; occurrence in Canada, 341, 480, 543; in N. America, 493; in U.S.A., 203, 356, 400, 407, 543, 603, 604, 668, 679, 739, 799; *Ribes* eradication against, in U.S.A., 203, 356, 739, 799; specific susceptibility to, 341; studies on, 341, 407; *Tuberculina maxima* parasitizing, 543; virulence of strains of, 407.
— — on *Ribes*, specific susceptibility to, and virulence to pine of strains of, in N. America, 407.
Crotalaria anagyroides, *Rosellinia bunodes* on, in Java, 425.
— *juncea*, *Macrophomina phaseoli* can infect, 267.
— —, *Uromyces de oratus* on, in Japan, 726.
— *spectabilis*, *Diaporthe crotalariae* on, in U.S.A., 765; *Phomopsis crotalariae* pycnidial stage of, 765.
— *striata*, *Fusarium* and *F. tracheiphilum* on, in Uganda, 422.
— *usaramoensis*, *Rosellinia arcuata* and *R. bunodes* on, in Java, 425.
— *vitatoni*, *Uromyces decoratus* on, in Japan, 726.
Crown disease of oil palm in Malaya, 354.
Cruciferae, *Alternaria brassicae*, *A. circinans*, *Bacillus carotovorus*, *Botrytis cinerea*, *Colletotrichum higginsianum*, *Corticium solani*, *Cystopus candidus*, *Erysiphe polygoni*, mosaic, *Peronospora parasitica*, and *Phoma lingam* on, in U.S.A., 546.
—, *Plasmodiophora brassicae* on, method of infection by, 347; nature of resistance to, 346; occurrence in Denmark, 608; in Russia, 346.
—, *Pseudomonas campestris* on, in Japan, 554; in U.S.A., 546.
—, *Rhizopus nigricans* and *Sclerotinia sclerotiorum* on, in U.S.A., 546.
Crumenula abietina on pine in Germany, 667; in Spain, 480; perfect stage of *Brunchorstia destruens*, 667.
Cryptococcus on man in U.S.A., 370, 630.
— *catanei*, see *C. montpellieri*.
— *fagi* in relation to *Nectria coccinea* on beech in Canada and U.S.A., 405.
— *farcinimosus* on the horse in the Sudan, 172.
— *gracilioides* synonym of *Pityrosporum ovale*, 442.
— *metaniger* renamed *Cladosporium metaniger*, 219.
— *montpellieri* on man in Algeria, 288.
[*Cryptococcus*] *psoriasis* probably the first name for *Pityrosporum ovale*, 442.
— *psychrofilicus* on man in the Argentine, 629.
Cryptodiaporthe, British species of, 595.
Cryptorrhynchus lapathi, transmission of *Pseudomonas saliciperda* on *Salix* by, in Holland, 61.
Cryptosporella araucariae on *Araucaria imbricata* in Italy, 63; perfect stage of *Fusicoccum araucariae*, 63.
Cryptosporium minimum on rose in Germany, 447.
Crystol, toxicity of, to *Trichophyton mentagrophytes*, 503.
Ctenomyces, reference of *Trichophyton* (*Sabouraudites*) *mentagrophytes* to, not accepted, 694.
Cucumber (*Cucumis sativus*), *Bacterium cucurbitae* on, in India and U.S.A., 547.
—, — *lacrymans* on, 547.
—, — *tumefaciens* on, biochemistry of, 148.
—, *Cercospora melonis* on, in Germany, 578.
—, *Cladosporium cucumerinum* on, in Holland, 485.
—, *Corticium solani* on, in Denmark, 709.
— diseases, control of, 264.
—, *Erysiphe cichoracearum* on, in England, 744.
— mosaic, effect of the host on the virus of, 108; occurrence in U.S.A., 108, 673; properties of virus of, 108; transmission of, by *Macrosiphum gei* and *Myzus persicae*, 673; by needle and rubbing, 673; to beet and spinach, 673; virus of, affecting spinach in U.S.A., 673; tobacco in U.S.A., 205, 539; tomato in Russia, 778.
—, potash deficiency in, in U.S.A., 663.
—, *Pseudoperonospora cubensis* on, control, 5, 493; epidemiology of, 5; factors affecting, 5; occurrence in Germany, 578; in U.S.A., 5, 493; study on, 5.
—, *Sclerotinia sclerotiorum* on, in Germany, 417.
—, virus diseases of, in Germany, 477.
Cucumis melo, see Cantaloupe, Melon.
— *sativus*, see Cucumber.
Cucurbita, see Squash.
— *pepo*, see Vegetable marrow.
Culture medium for intestinal bacteria, bacteriophage, and fungi pathogenic to man, 217.
Cumin (*Cuminum cyminum*), *Alternaria* on, in India, 551.
—, *Erysiphe polygoni* on, in India, 393.
Cunninghamella, effect of excretions of, on growth of wheat, 85.
Cunninghamia lanceolata, *Lophodermium pinastri* on, in China, 396.
Cuprammonium spray, use of, against fruit diseases, 42.
Cupressus sempervirens, *Bacterium tumefaciens* on, in U.S.A., 270, 405.
Cupric chloride, use of, against *Ustilago avenae* on oats, *U. hordei* on barley, and

wheat bunt, 153. (See also Copper chloride.)
[Cupric] sulphur, use of, against *Plasmopara viticola* on vine, 199.
Cupromaag, use of, against *Venturia inaequalis* on apple and *V. pirina* on pear, 450.
Cuprous chloride, use of, against *Ustilago avenae* on oats, *U. hordei* on barley, and wheat bunt, 153. (See also Copper chloride.)
— oxide, see Copper oxide, red.
Cupulvit, use of, against *Venturia inaequalis* on apple, 31.
Curculionidae, (?) transmission of sandal spike by, in India, 129.
Curly dwarf of potato, recent work on, 187.
— top of bean, control, 1; *Eutettix tenella* in relation to, 195; occurrence in U.S.A., 1, 195, 196.
— — of beet, control of insect vector of, 196; host range of, 446, 447; occurrence in U.S.A., 195, 196, 349, 446, 748; transmission of, by *Eutettix tenella*, 195, 196, 446, 748; by needle, 349; to spinach, 349; to tomato, 349, 748; varietal resistance to, 748.
— — of ornamental flowering plants in U.S.A., 446.
— — of tomato, notes on, 424; occurrence in U.S.A., 196, 424, 748; physiological effects of, 424; transmission of, by *Eutettix tenella*, 748; from beet, 748.
Currants (*Ribes* spp.), *Cronartium ribicola* on, legislation against, in U.S.A., 381; occurrence in U.S.A., 407; virulence of, to pine, 407.
—, eradication of, see *Ribes* eradication.
—, leaf scorch of, control, 302, 773; etiology of, 773; occurrence in Austria, 302; in Germany, 773; in Holland, 705.
—, *Mycosphaerella grossulariae* on, in Denmark, 640.
—, *Pseudopeziza ribis* on, breeding against, 519; control, 773; factors affecting, 302; occurrence in Austria, 302; in Germany, 519, 773; in Holland, 705; varietal susceptibility to, 773.
—, reversion of, and *Stereum purpureum* on, in Holland, 705.
—, *Verticillium albo-atrum* on, in Germany, 117.
—, — *dahliae* on, in England, 488; in Holland, 705; 'Bangert' disease and 'oedema' attributed to, 705.
Cutarsol, use of, against *Venturia inaequalis* on apple, 32.
Cyanamide, use of, against cereal rusts, 151, 271.
Cyanide fumigation injury to citrus following Bordeaux spraying, 690.
Cyanmercuricresol a constituent of germisan, 305.
Cycas revoluta, *Ascochyta cycadina* on, in India, 395.
Cycloconium oleaginum on olive, legislation against, in Spain, 127; occurrence in Italy, 522; in Spain, 127.
Cydonia vulgaris, see Quince.
Cylindrocarpon on cacao in England, 149.
— *radicicola* on narcissus in England, 224.
Cylindrophora albedinis on date palm in Morocco, 626.
Cynara scolymus, see Artichoke.
Cynodon dactylon, *Brachysporium* on, in Japan, 584.
— —, *Corticium solani* on, in Malaya, 355.
— —, *Helminthosporium* on, in S. Africa, pycnidial production by, 163.
Cynosurus cristatus, *Puccinia lolii* can infect, 274.
Cyperus iria, *Brachysporium* on, in Japan, 584.
Cystopus on banana, 39.
— *candidus* on crucifers in U.S.A., 546.
Cystospora maintained as a genus of the Plasmodiophoraceae, 469.
Cytospora can infect cottonwood, 270.
— on *Salix babylonica* in U.S.A., 270.
— on spruce in U.S.A., 407.
— on walnut in U.S.A., 270.
— (?) *ambiens* on elm in U.S.A., 125.
— *chrysosperma* on poplar in Belgium, 677.
— *sacchari* on sugar-cane in U.S.A., 114.
Cytosporella populi synonym of *Chondroplea populea*, 790.
Cytosporina citriperda on orange in Italy, 758; (?) synonym of *C. glaucescens*, 759.
— *glaucescens* on orange in N. Africa, 758; *Septoria glaucescens* renamed, 759.
— *ludibunda* on apple, factors affecting, 32; pycnidial formation in, 782; virulence of, and its saltants, 377, 573.
Cyttaria darwini, *C. harioti*, *C. hookeri*, and *C. intermedia* on *Nothofagus* in S. America, 116.
Cyttariella deformans, *Podocrea deformans* renamed, 116.
— *skottsbergii* on *Nothofagus betuloides* in S. America, 116.

Dactylis glomerata, *Bacterium rathayi* on, in Denmark, 294; in Germany, 571.
— —, *Puccinia glumarum* on, in France, 177.
— —, — *lolii* can infect, 274.
Dactylium dendroides on mushrooms in England, 353.
Daffodil, see *Narcissus*.
Dahlia, *Bacterium tumefaciens* on, in Austria, 26.
—, *Botrytis cinerea* on, in Austria, 25.
—, *Entyloma dahliae* on, control, 26; occurrence in Austria, 26; in England, 26; in Guatemala and Holland, 177; in Poland, 550; in S. Africa, 142; in Sumatra, 177; study on, 26; specific and varietal susceptibility to, 26, 177.
—, (?) *Erysiphe cichoracearum* and *Fusarium* on, in Austria, 26.
—, *Macrophomina phaseoli* on, in U.S.A., 763; *Macrophoma henriquesiana* (?) identical with, 763; *Rhizoctonia batatícola* strain C a stage of, 763.

[Dahlia] mosaic in U.S.A., 374, 697; relation of, to 'dahlia stunt', 697; transmission of, by grafting and by *Myzus persicae*, 374, 697.
—, oak-leaf virus disease of, in U.S.A., 375, 697.
—, ring spot of, in U.S.A., 374, 697.
—, *Sclerotinia sclerotiorum* on, in Austria, 26.
— stunt in U.S.A., 697.
—, tomato spotted wilt virus can infect, 59, 730.
—, *Verticillium dahliae* on, in Austria, 26.
—, yellow ring spot of, in U.S.A., 697.
Dalbergia sissoo, *Cercospora sissoo* on, in India, 395.
Daldinia, formation of black lines in wood by, 544.
—, monograph of, 193.
Damping-off of conifers in U.S.A., 269.
— of soy-beans in U.S.A., 109.
'Daon lidah' disease of tobacco in Sumatra, 471; transmission of, from and to *Physalis angulata*, 471.
Daphniphyllum macropodium, *Gloeosporium* (?) *kawakamii* on, in Italy, 375.
Dark centre of swedes in U.S.A., 494.
Dasyscypha calycina on larch in England, 342; in U.S.A., 733.
— — on pine in Poland, 550.
— *ellisiana* on pine and *Pseudotsuga taxifolia* in U.S.A., 733.
Date palm (*Phoenix dactylifera*), baïoud disease of, see *Cylindrophora albedinis* on.
— —, 'belaât' of, see *Phytophthora* on.
— —, *Ceratostomella paradoxa* on, in Tunis, 302.
— —, *Cylindrophora albedinis* on, in Morocco, 626.
— —, *Diplodia natalensis* on, in Tunis, 302.
— —, 'dry bone' of, in Tunis, 303.
— —, *Graphiola phoenicis* on, in U.S.A., 270.
— —, *Mauginiella scaettae* on, in Tunis, 303.
— —, *Phomopsis phoenicicola* on, in Tunis, 302.
— —, *Phytophthora* on, in N. Africa, 627.
— —, *Saccharomyces ellipsoideus* and *Torula* on, in U.S.A., 379.
Datura stramonium, *Bacterium solanacearum* can infect, 488.
— —, — *tumefaciens* can infect, 680.
— —, healthy potato virus can infect, 318.
— —, Hy. III virus of *Hyoscyamus niger* can infect, 243.
— —, potato mosaic can infect, 587.
— —, — necrotic virus can infect, 388.
— —, tobacco 'female sterility virus' can infect, 599.
— —, — mosaic can infect, 120, 313.
— —, tomato spotted wilt can infect, 730.
— —, virus of, in U.S.A., 79; relation of, to tomato streak, 79.
— —, X virus can infect, 582; protective inoculation against, 582.
Daucus carota, see Carrot.
Davalia, *Triposporium stapeliae* on, in S. Africa, 764.
Deep scald of apple in New Zealand, 574.
Degeneration of potato, dehydration capacity of tubers in relation to, 239; ecological factors affecting, 461; electrometric diagnosis of, 531; etiology of, 587, 716, 783; melanin formation in relation to, 531; note on, 238; occurrence in France, 75; in Germany, 238, 239, 461, 531; in Switzerland, 783; review of recent work on, 716. (See also Virus diseases of.)
— of sugar-cane, effect of altitude on, 56.
Delphinium, virus disease of, in U.S.A., 473; host range of, 474.
—, witches' broom of, in U.S.A., 449.
— *nudicaule*, beet curly top virus can infect, 447.
Dematium pullulans, see *Pullularia pullulans*.
Dendroleptosphaeria proposed as sub-division of *Leptosphaeria*, 726.
Deodar (*Cedrus libani* var. *deodara*), *Fomes annosus* on, in India, 605.
Dermatea [illegible] on *Tsuga canadensis* in U.S.A., [illegible] *Cenangium balsameum* renamed, 131; *Gelatinosporium abietinum* conidial stage of, 131.
— *livida* on *Tsuga canadensis* in U.S.A., 131; (?) perfect stage of *Myxosporium*, 131.
Dermatomycosis of man, history of research on, 569; increase of, in Europe, 173; occurrence in Algeria, 510; in Canada, 23; in Germany, 444; in Portugal, 442; in U.S.A., 508, 569, 630.
Dermatophytes, medium for the cultivation of, 442.
Dermocystidium, systematic position of, 171.
— *branchialis* on *Trutta fario*, 171.
— *pusula* on *Triton marmoratus*, 171.
Deuterophoma tracheiphila on citrus in Italy, 565.
— — on lemon, control, 214, 565; legislation against, in Italy, 256; occurrence in Italy, 214, 256, 565; varietal resistance to, 565.
Dewberry (*Rubus*), *Leptosphaeria coniothyrium* on, in U.S.A., 145.
— mosaic in U.S.A., 770.
— rosette in U.S.A., 680.
Diabrotica longicornis as vector of *Aplanobacter stewarti* on maize in U.S.A., 364.
Diamesa, *Stachylina longa* on, in Alpine waters, 511.
—, — *macrospora* on, in Alpine waters, 512.
Diamond canker of plum in U.S.A., 79, 180.
Dianthus barbatus, curly top of beet affecting, in U.S.A., 446.
— *caryophyllus*, see Carnation.
Diaporthe, monograph of British species of, 595.
— on citrus in U.S.A., 495.
— on poplar in Belgium, 677.
—, virulence of species of, to apple, 573

[*Diaporthe*] *citri* on citrus, control, 495; notes on, 495; occurrence in Brazil, Japan, Palestine, and S. Africa, 213; (?) in S. Australia, 141; in Spain, 213; in U.S.A., 213, 495; overwintering of, 495; perfect stage of *Phomopsis californica* and *P. citri*, 213.
— — on lemon in U.S.A., 89.
— — on orange in Tunis, 302.
— *conorum* on *Tsuga canadensis* in U.S.A., 132; *Phomopsis occulta* conidial stage of, 132.
— *crotalariae* on *Crotalaria spectabilis* in U.S.A., 765; *Phomopsis crotalariae* pycnidia. stage of, 765.
— *eres* on conifers and woody plants in Great Britain, 595.
— (?)— on elm in U.S.A., 125, 126; *Phomopsis oblonga* regarded as imperfect stage of. 126.
— *perniciosa* on apple, factors affecting, 33; occurrence (?) in U.S.A., 226; perfect stage of *Phomopsis mali*, 226; virulence of, 573.
— — on plum in Belgium, 677.
— *phaseolorum* on *Phaseolus lunatus* in U.S.A., 2.
— *umbrina* on rose, control, 25, 696; occurrence in England, 25, 291; in U.S.A., 25, 633, 696; pathogenicity of, 25.
Diaporthopsis, British species of, 595.
Dibotryon morbosum on cherry and plum, legislation against, in Bulgaria, 592; occurrence in Canada, 704.
— — on *Prunus pennsylvanica* in Canada, 704.
Didymella applanata on raspberry in Germany, 519; in Holland, 705.
— *lycopersici* can infect *Solanum racemigerum*, 477.
(?) — — on potato in Jersey, 549.
— — on tomato, breeding against, 477; control, 223, 663; necrotic effect of, on phloem, 44; notes on, 662; occurrence in Germany, 233, 477, 662, 663; in Jersey, 549; spread of, from tomato sticks, 663; toxic action of, due to an amino compound, 315; varietal resistance to, 477.
Die-back of *Abies pectinata* in Germany, 480.
— of cacao in Surinam, 207.
— of cassava in Sierra Leone, 202, 553.
— of citrus in Egypt, 749.
— of coffee in India, 435; in Uganda, 422.
— of *Hevea* rubber in Ceylon, 591; in Malaya, 507.
— of lemon in U.S.A., 434.
— of pepper in Java and Sumatra, 425.
— of plum in U.S.A., 615.
— of poplar in Italy, 62.
Digitalis ambigua, beet curly top virus can infect, 447.
— —, mycorrhiza of, in Italy, 309.
Dimerosporium in soil in Czecho-Slovakia, 535.
— *pandani* on *Pandanus lambooensis* in Samoa, 98.
Dinitrophenol, use of, as a timber preservative, 342.
Diospyros kaki, see Persimmon.
Diphenylthiourea, toxicity of, to fungi, 304.
Diplocarpon earliana on strawberry in U.S.A., 679.
— *rosae* on rose, control, 25, 223, 573, 696; occurrence in England, 233; in Germany, 570; in U.S.A., 25, 573, 633, 696; varietal susceptibility to, 223, 570.
Diplodia on citrus in Sierra Leone, 553.
— on coco-nut (copra) in Malaya, 355.
— on *Hevea* rubber in Ceylon, 591.
— on nutmeg in Java, 425.
— stages of *Tryblidiella*, similarity of, to those of *Physalospora*, 791.
— *amphisphaeroides* on oak in Italy, 746.
— *cinnamomi* on cinnamon in Portugal, 726.
— *frumenti* on maize in Tanganyika, 552; pycnidial stage of *Physalospora zeicola*, 366.
— *gossypina* pycnidial stage of *Physalospora rhodina*, 366.
— *macrospora* on maize in Tanganyika, 201, 552.
— *natalensis* pycnidial stage of *Physalospora rhodina*, 366.
— — on avocado pear in Brazil, 707.
— — on citrus, control, 20, 21, 506; factors affecting, 21; mixed inoculations with, 21; notes on, 506; occurrence in Cyprus, 506; in Palestine, 20, 21.
— — on date palm in Tunis, 302.
— (?) — on grapefruit in Ceylon, 77.
— *tubericola* can infect avocado, cotton, fig, grapefruit, mango, orange, papaw, peach, *Ricinus communis*, sweet potato, and watermelon, 366.
— — on maize in U.S.A., 366.
— *ulmi* on elm in U.S.A., 125.
— *viticola* on vine in Rumania, 486.
— *zeae* on maize, control, 12, 644; effect of *Aplanobacter stewarti* on infection by, 364; of X-rays on, 644; legislation against, in Bulgaria, 592; losses caused by, 12; notes on, 268, 775; occurrence in Rhodesia, 775; in Tanganyika, 201, 552; in U.S.A., 12, 268, 364, 563, 644.
Diplodina antirrhinicola on *Antirrhinum* in Portugal, 726.
Diplogaster, *Arthrobotrys oligospora* on, in U.S.A., 512.
— and *Diploscapter coronatus*, fungi capturing, in U.S.A., 762.
Dipsacus fullonum, *D. pilosus*, and *D. sylvestris*, fungi on, in Russia, 631.
Discosia theae on tea in Indo-China, 147.
Discula pinicola var. *mammosa* on wood pulp in Norway, 69.
— *platani* a stage of *Gnomonia veneta*, 735.
Dissophora nadsonii on oak in the Caucasus, 339; *Mucor hiemalis* and *M. mucedo* (?) parasitized by, 339.
Dog, *Aspergillus fumigatus*, *A. kortai*, *A.*

nantae, and *A. tunetana* can infect the, 445.
[Dog], *Coccidioides immitis* on the, in U.S.A., 288.
Dolichos lablab, *Macrophomina phaseoli* on, in Tanganyika, 201.
Dorylaimus, *Anulosporium nematogenum* on, in U.S.A., 762.
Dothichiza populea on poplar, legislation against, in Germany, 800; occurrence in France, 127; in Germany, 800; renamed *Chondroplea populea*, 790.
Dothideales, list of, from the American tropics, 396.
Dothiora sorbi renamed *Tylophoma sorbi*, 790.
Bothiorella on avocado pear in U.S.A., 79.
— on *Cocos plumosa* in U.S.A., 79.
— *populea* synonym of *Chondroplea populea*, 790.
Dracaena draco, *Phyllostictella draconis* on, in Italy, 293.
Drake and Fletcher D.S.P. sprayer, 436.
Drosophila rubrostriata transmitting *Phoma lingam* on swedes, 134.
Drought spot of apple and pear in U.S.A., 769.
'Dry bone' of date palm in Tunis, 303.
— rot of beet, control, 2, 135, 609; factors affecting, 135, 545; losses caused by, 266; occurrence in Austria, 135; in Czecho-Slovakia, 545; in France, 135; in Germany, 266, 609; in Holland, 2; relation of, to boron deficiency to, 2, 609; study on, 2. (See also *Mycosphaerella tabifica*, *Phoma betae*.)
— top rot of sugar-cane in Porto Rico, 466.
Dupont granosan, see Granosan.
Duranta plumieri, *Ganoderma lucidum* on, in Ceylon, 77.
Dust calendars for pome and stone fruits in U.S.A., 699.
Dusting against fruit diseases in N. America, 774.
— apparatus, 304, 577.
— injury, 30, 42, 325.
— versus spraying against *Alternaria solani* on potato, 654; against cereal rusts, 272; against *Gloeosporium ampelophagum* on vine, 265; against *Phytophthora infestans* on potato, 240, 613, 654; against *Venturia inaequalis* on apple, 30.
Dusts I and II, use of, against *Fusarium* on cereals, 755.
—, see also Seed disinfectant dusts.
Dwarf disease of lucerne in U.S.A., 177.
— — of sugar-cane in Queensland, 245.
Dwarfing of mango in Egypt, 749.
Dyes, aniline, toxicity of, to certain Dermatomycetes, 371; to *Gloeosporium perennans*, 299; to *Mucor*, 693; to *Neofabraea malicorticis*, 299.
—, —, use of, against *Plasmopara viticola* on vine, 74; in testing adhesiveness of seed disinfectant dusts, 558.
—, see also Eosin, Phenosafranin.
Dying-off of coffee (non-parasitic), in Costa Rica and Portuguese W. Africa, 168, 761; 'yellowing' of, in Kenya identical with, 761.
[Dying-off] of oaks in Jugo-Slavia, 600.
— of pine in France, 603.
— of strawberry in France, 488.
— of *Zostera marina*, factors affecting, 712; occurrence in Canada, 308, 646, 712; in England, 712; in France, 308, 711; in Holland, 308, 712; in Portugal, 712; in U.S.A., 308, 646, 712; stated to be a bacterial disease, 308, 712.
Dysdercus transmitting *Nematospora* on cotton in Nyasaland, 439; transmitting *N. coryli* and *N. gossypii* on cotton in S. Africa, 439.

Echeveria multicaulis purpurea, *Phoma* on, in Italy, 27.
Eggplant (*Solanum melongena*), *Bacterium tomato* can infect, 555.
—, *Cercospora* on, in Réunion, 680.
—, — *melongenae* on, in Sierra Leone, 203.
—, *Oidiopsis* on, in Cyprus, 747.
—, *Phomopsis vexans* on, in China, 395.
—, *Phytophthora infestans* on, in France, 75.
—, potato calico can infect, 615.
—, *Pythium ultimum* on, in U.S.A., 232.
—, *Stemphylium solani* on, in U.S.A., 60.
—, tobacco mosaic can infect, 119.
—, tomato spotted wilt virus can infect, 59.
—, *Verticillium albo-atrum* on, control, 494; factors affecting, 494; notes on, 117; occurrence in U.S.A., 117, 494; pathogenicity of, 470.
—, — *dahliae* can infect, 470.
'Eisenfleckigkeit' of potato, see Spraing.
Elaeagnus commutata, *Puccinia lolii* on, in Canada, 364.
Elaeis guineensis, see Oil palm.
Elaphomyces in association with beech, larch, pine, spruce, and *Thuja plicata* in Scotland forming mycorrhiza, 529.
Electric light, use of, for soil disinfection in U.S.A., 42.
Eleocharis tuberosa, *Ceratostomella paradoxa* on, from China, 335.
Eleusine coracana, *Helminthosporium* and *Piricularia oryzae* on, in Ceylon, 77.
— —, *Sclerotium rolfsii* on, in India, 267.
— *indica*, *Piricularia grisea* on, in China, 395.
Elm (*Ulmus*), *Aleurodiscus oakesii* on, in U.S.A., 601.
—, *Alternaria* on, in U.S.A., 124, 125.
—, *Anthostomella* and *Botryodiplodia ulmicola* on, in U.S.A., 125.
—, *Cephalosporium* on, in U.S.A., 125, (?) 404.
—, *Ceratostomella pluriannulata* on, 665.
—, — *ulmi* on, *Cephalosporium* stage of, 542; control, 194, 252, 334, 478, 542, 591, 666, 737, 795; decline of virulence of, in England, 126, 334; factors affecting, 194; heterothallism in, 126; host range of, 665; infection of wounds

by 665; legislation against, in Germany, 591; in Holland, 737; in S. Rhodesia, 399; losses caused by, 194; notes on, 194, 541; occurrence in Belgium, 478; in Bulgaria, 252; in England, 126, 334; in France, 194; in Germany, 578, 591; in Holland, 126, 478, 541, 665, 737; in Italy, 200, 334, 404, 541, 734; in Jugo-Slavia, 252; in Rumania, 666; in Switzerland, 194; in U.S.A., 252, 733, 794; pathogenicity of, 194, 542; perithecial formation in, 665; recovery from, 334; studies on, 126, 252, 404, 479, 541, 665, 666, 734; transmission of, by *Pteleobius vittatus*, 734; by *Scolytus*, 126, 252, 478, 734, 795; varietal resistance to, 126, 200, 404, 478, 665, 666, 734, 737.

[Elm], *Coniothyrium* and *C. ulmi* on, in U.S.A., 124.

—, *Cytospora* (?) *ambiens* on, in U.S.A., 125.

—, *Diaporthe* (?) *eres* on, in U.S.A., 125, 126; *Phomopsis oblonga* pycnidial stage of, 126.

—, *Diplodia ulmi*, *Fusarium oxysporum*, and *F. scirpi* var. *compactum* on, in U.S.A., 125.

—, *Gloeodes pomigena* on, in U.S.A., 298.

—, *Gnomonia ulmea* on, in U.S.A., 251.

—, *Haplosporella nervisequa* on, in Germany, 666; *Sphaeropsis nervisequa* renamed, 666.

—, (?) *Leptosphaeria coniothyrium* on, in U.S.A., 124.

—, *Micrococcus ulmi* on, in Switzerland, 194.

—, *Nigrospora sphaerica*, *Phoma*, and (?) *P. conidiogena* on, in U.S.A., 125.

—, *Phomopsis* on, in U.S.A., 125. (See also *Diaporthe eres*.)

—, *Pseudomonas lignicola* on, in Switzerland, 194.

—, *Vermicularia* on, in U.S.A., 124.

—, *Verticillium* on, in U.S.A., 404.

—, — *albo-atrum* on, notes on, 117; occurrence (?) in England, 334; in Germany, 117; in U.S.A., 125.

—, wilt of, in U.S.A., 124.

Elosal, effect of, on assimilation of wheat leaves, 382.

Elsinoe ampelina, perfect stage of *Gloeosporium ampelophagum*, 596.

— *canavaliae* on *Phaseolus lunatus* in Cuba, 742.

— — — — — var. *macrocarpus* from Jamaica, 335.

— *ledi* on *Ledum*, *Aulographum ledi* renamed, 661; occurrence in Newfoundland and U.S.A., 661; *Sphaceloma* imperfect stage of, 661.

— *veneta* distinct from *Sphaceloma rosarum*, 96.

— — on raspberry, control, 456; occurrence in Great Britain, 771; in Holland, 705; in U.S.A., 456; studies on, 456, 771.

— — perfect stage of *Gloeosporium venetum*, 596, 771.

Elymus, *Puccinia glumarum* can infect, 273.

—, — *triticina* can infect, 274.

— *canadensis*, *Erysiphe graminis* on, 362.

Elytroderma deformans on pine in Canada and U.S.A., 254; *Hypoderma deformans* renamed, 254.

Empusa fresenii on *Aphis laburni* in Sierra Leone, 553.

— *grylli* on locusts in Kenya, 9.

Enantiothamnus braulti on man in N. Africa, 288.

Encephalartos horridus, *Phoma encephalarti* on, in Somaliland, 536.

Endogone as the mycorrhizal endophyte of various plants, 309, 312.

Endomyces on man in U.S.A., 370.

— *albicans* on man in France, 288.

— *capsulatus* var. *isabellina* on man in U.S.A., 441.

— *dermatitidis* on man, *Blastomyces dermatitidis* renamed, 441; occurrence in the Argentine, 629; in U.S.A., 23, 441; studies on, 23, 441.

— *fibuliger* on bread in Russia, 625.

Endothia parasitica on chestnut, breeding against, 601; legislation against, in Bulgaria, 592; in Portugal, 672; in S. Rhodesia, 399; loss of virulence of, 355; notes on, 355; occurrence in U.S.A., 205, 355, 601.

Entomogenous fungi of Great Britain, 216.

— —, use of, against citrus insect pests in U.S.A., 567.

Entomosporium on loquat in New S. Wales, 231.

Entyloma dahliae on dahlia, control, 26; occurrence in Austria, 26; in England, 26; in Guatemala and Holland, 177; in Poland, 550; in S. Africa, 142; in Sumatra, 177; study on, 26; specific and varietal susceptibility to, 26, 177.

— *ellisii* on spinach from Cuba, 335.

— *fuscum* on opium poppy in Rumania, 550.

— *oryzae* on rice, legislation against, in U.S.A., 464.

— *physalidis* on *Physalis peruviana* in Tanganyika, 201.

Enzyme research, series of papers on, 386.

Eosin, effect of, on seed germination and growth, 535.

Epicoccum in air of apple orchards in England, 32.

— *chrysanthemi* on *Chrysanthemum* in S. Africa, 764.

— *granulatum* parasitizing *Claviceps* on *Lolium italicum* in England, 32.

— *neglectum* on rice in Japan, 533.

— *purpurascens* on wood pulp in Norway, 69.

Epidermophyton on man in Canada, 28.

— *floccosum* on man, control, 509; factors affecting, 629; occurrence in Denmark, 95; in Japan, 94; in U.S.A., 509, 630; toxicity of pine oils to, 291.

[*Epidermophyton floccosum*], thermal death point of, 629.
— —, vaccination with extracts of, against dermatomycoses, 694.
— *inguinale*, see *E. floccosum*.
— *interdigitale* on man in Denmark, 95; in Germany, 95, 444; in U.S.A., 630; trichophytin test in the diagnosis of, 630.
Epiphyllum spp., mosaic of, in Germany, 570.
— *truncatum*, mosaic of, (?) in Czecho-Slovakia, 294; in Germany, 570; transmission of, by *Orthezia insignis* and by sap, 294.
Eragrostis aspera, *Sclerospora butleri* on, in Nyasaland, 766.
Eremothecium cymbalariae on cotton, notes on, 566.
Erianthus, *Ustilago* on, 723.
Eriobotrya japonica, see Loquat.
Eriodendron anfractuosum, *Bacterium malvacearum* on, in Guatemala, 169.
— —, *Cercospora italica* on, in Italian Somaliland, 547.
Eriosoma lanigera in relation to *Gloeosporium perennans* on apple in Canada, 701.
Eriostemon crowei and *E. lanceolatus*, mycorrhiza of, in New S. Wales, 311; *Endogone* and *Rhizoctonia* forming, 312.
Erysiphaceae, list of, in China, 661.
—, turgescence of host tissue in relation to attack by, 715.
Erysiphe cichoracearum on cantaloupe in U.S.A., 182, 615.
— — on cucumber in England, 744.
(?) — — on dahlia in Austria, 26.
— — on sunflower in Russia, 571.
— — on tobacco, control, 118; factors affecting, 118; occurrence in Java, 118; in Réunion, 680; in Tanganyika, 201.
— *graminis* on *Agropyron repens*, *Agrostis alba*, and *Arrhenatherum elatius*, 362.
— — on barley in Germany, 620; in U.S.A., 78.
— — on *Bromus*, *Elymus canadensis*, *Festuca elatior*, *F. rubra*, *Hordeum jubatum*, and *H. murinum*, 362.
— — on oats in Germany, 620.
— — on wheat, factors affecting, 620; genetics of resistance to, 78; nature of resistance to, 620; occurrence in Germany, 620; in New Zealand, 496; in U.S.A., 78, 362; physiologic forms of, 78, 362; study on, 620; varietal resistance to, 78, 362.
— *polygoni* on beans in U.S.A., 2, 495, 673.
— — on clover, breeding against, 78; note on, 615; occurrence in U.S.A., 78, 207, 615; physiologic forms of, 207; strains resistant to, 207.
— — on crucifers in U.S.A., 546.
— — on cumin in India, 393.
— — on lentil in Siberia, 307.
— — on oak in China, 725.
— — on peas in India, 551; in U.S.A., 412.
Erythrina, *Nectria anisophila* on, in Costa Rica, 438.
— *indica*, *Ovulariopsis* on, in Réunion, 680.
Esters in relation to storage spots of citrus, 565.
Etch disease of tobacco, 205.
Ether, effect of, on *Sporotrichum beurmanni*, 23; on *Trichoderma lignorum*, 46; on susceptibility of cauliflower to *Alternaria brassicae* and of bean to *Uromyces appendiculatus*, 45.
—, toxicity of, to *Coniophora cerebella* and *Merulius lacrymans*, 261.
Ethyl alcohol, effect of, on *Trichoderma lignorum*, 46; on susceptibility of cauliflower to *Alternaria brassicae* and of bean to *Uromyces appendiculatus*, 45.
— —, use of, in hot-water treatment of wheat against *Ustilago tritici*, 500.
— mercury chloride, as a constituent of ceresan (American), 144.
— — —, use of, against *Ceratostomella* on timber, 344, 345; against timber moulding fungi, 344.
— — oleate, use of, against *Ceratostomella* on timber, 668.
— — phosphate, use of, against timber moulding and staining fungi, 344.
Ethylene gas, effect of, on bitter pit of apples, 103.
— —, use of, against *Diplodia natalensis* on citrus, 20.
Eucalyptus, *Rhizoctonia lamellifera* on, in Rhodesia, 727.
— *coccifera* and *E. cornuta*, intumescences on, in U.S.A., 529.
— *paniculata*, *Armillaria mellea* on, in S. Africa, 142.
— *rostrata*, *Macrophomina phaseoli* on, 727.
Eugenia latifolia, *Pseudomonas hypertrophicans* on, in Surinam, 435.
Eulecanium corni in relation to sooty mould of plum in Austria, 575.
Euonymus japonicus, *Oidium euonymi-japonici* on, in Germany, 578.
Euphorbia, *Verticillium* on, in Italy, 338.
— *helioscopia*, *Bacterium tumefaciens* can infect, 81.
Euphrasia, Chytridiacean fungus on, in Italy, 309.
Eurychora rosicola on rose in Brazil, 447.
Euscelis striatulus, transmission of false blossom of cranberry by, in U.S.A., 706.
Eutettix tenella, control of, in U.S.A., 196; transmission of beet curly top by, in U.S.A., 195, 196, 446, 748; to bean, 195; from ornamentals, 446; to tomato, 748.
Exobasidium japonicum on *Rhododendron* in Germany, 578.
— *laŭri* on *Laurus nobilis*, 664.
— *monosporum* on *Camellia sasanqua* in U.S.A., 698.
— — on *Gordonia* in Japan, 698.
— *oxycocci* on *Rhododendron catawbiense* and *R. maximum* in U.S.A., 696.
— *sawadae* on *Cinnamomum cassia* in China, 724.
— *vaccinii* on *Rhododendron* in U.S.A., 205, 696.

[*Exobasidium vaccinii*] on *Rhododendron indicum*, legislation against, in Germany, 398.
— *vexans* on tea, legislation against, in S. Rhodesia, 463.

Fabraea fragariae on strawberry in Holland, 705.
— *maculata* on medlar in Italy, 181.
— — on pear in New S. Wales, 231.
Fagopyrum esculentum, see Buckwheat.
Fagus, see Beech.
False blossom of cranberry in U.S.A., 706; transmission of, by *Euscelis striatulus*, 706.
— leaf scald of sugar-cane, see Fourth disease of.
'Faroosh' of orange in Palestine, 284.
Farysia, differences between *Liroa* and, 726.
— *emodensis* synonym of *Liroa emodensis*, 726.
Fasciola hepatica, *Catenaria anguillulae* on, artificial cultivation of, 93.
Fatsia japonica, *Verticillium* on, in Italy, 338.
Favolus brasiliensis, hyphal pegs in, 341.
Fegatella conica, *Cephalosporium*, *Fusarium*, *Mucor* (?) *rhizophilus* on, and mycorrhizal endophyte of, in Italy, 235.
Feijoa sellowiana, *Coryneum feijoae* on, in Italy, 293.
'Female sterility virus' of tobacco in Russia, 600, 728; transmission of, to *Datura stramonium*, *Nicotiana glauca*, *N. langsdorffii*, *N. rustica*, and tomato, 599.
Fenchyl alcohol, toxicity of, to *Sporotrichum schenckii* and *Trichophyton granulosum*, 291.
Ferric sulphate, a constituent of 'Saatbeize für Roggen', 306.
Ferrous sulphate, use of, against 'little leaf' of fruit trees, 99; against tobacco mosaic, 540. (See also Iron sulphate.)
Fertilizers, effect of, on *Actinomyces scabies* on potato, 189, 289, 320, 589, 651; on *Aphanomyces euteiches* on peas, 413; on apple scald, 423; on *Ascochyta pinodella* on peas, 484; on *A. pisi* on peas, 483; on *Bacillus lathyri* on tomato, 731; on bacteriosis of cotton, 508; on *Bacterium malvacearum* on cotton, 507; on black bean disease of coffee, 22; on blossom-end rot of tomato, 733; on blotchy ripening of tomato, 549; on *Botrytis cinerea* on pine and other conifers, 340; on brunissure of the vine, 676; on *Calonectria graminicola* on cereals, 623; on chlorosis of rose, 373; on *Corticium koleroga* on coffee, 436; on *Corticium solani* on tomato, 780; on *Cytosporina ludibunda* on apple, 32; on dry rot of beet, 135; on *Erysiphe graminis* on cereals, 620; on flax sickness, 221; on *Fomes lignosus* on *Hevea* rubber, 721; on frenching of tobacco, 205; on *Fusarium* on onion, 614; on *F. conglutinans* var. *callistephi* on China aster, 374; on *F. lycopersici* on tomato, 714; on *F. oxysporum cubense* on banana, 381; on *Gloeosporium perennans* on apple, 453; on deficiency symptoms in hops, 785; on 'glasshouse streak' of tomato, 731; on grey speck of oats and other crops, 20; on 'growth failure' of sugar-cane, 723; on gummosis of apricot, cherry, peach, and plum, 181; on *Helminthosporium ocellum* and *H. stenospilum* on sugarcane, 722; on *Hemileia vastatrix* on coffee, 436; on leaf discoloration of the vine, 353; on leaf-diseased plants, 753; on leaf roll of potato, 236; on leaf scorch of currant, 302, 773; of gooseberry, 302; on *Leptosphaeria herpotrichoides* on wheat, 279; on mosaic of tobacco, 581; on mycorrhiza of wheat and other plants, 310; on *Mycosphaerella pinodes* on peas, 484; on *Ophiobolus graminis* on wheat, 156, 279; on *O. herpotrichus* on wheat, 279; on *Phytophthora erythroseptica* and *P. infestans* on potato, 141; on *Plasmodiophora brassicae* on cabbage, 355, 493; on cauliflower, 355; on rape, 412; on *Plasmopara viticola* on vine, 352; on *Podosphaera leucotricha* on apple, 140, 517; on *Pseudomonas savastanoi* on olive, 522; on *Pseudopeziza ribis* on currant and gooseberry, 302; on *Puccinia asparagi* on asparagus, 745; on *P. triticina* on wheat, 206, 274; on reclamation disease of barley, beans, clover, lucerne, oats, peas, and swedes, 656; on *Rhizoctonia* on *Piper betle*, 420; on root rot of peas, 609; on rougeau of the vine, 487, 675; on 'sand drown' of tobacco, 146; on *Sclerotinia sclerotiorum* on tobacco, 729; on tomato, 780; on soil fungi, 140; on *Sporotrichum citri* on citrus, 166; on spraing of potato, 392; on storage diseases of fruit, 295; on stripe of tomato, 731; on *Verticillium albo-atrum* on various hosts, 117; on witches' broom of cacao, 144; on yellowing of sugar-cane, 536; on yellows of tea, 538.
Festuca elatior, *Erysiphe graminis* on, 362.
— —, *Puccinia* on, in Italy, 498.
— *poa*, *Tilletia narduri* on, in Morocco, 469.
— *pratensis*, beneficial effect of *Mucor racemosus* on, 535.
— *rubra*, *Erysiphe graminis* on, 362.
Ficus, *Aithaloderma fici* on, in the Philippines, 115.
— *carica*, see Fig.
— *elastica*, *Phyllosticta roberti* and *Physalospora elasticae* on, in Portugal, 726.
Fig (*Ficus carica*), *Bacterium fici* on, in Italy, 746.
—, *Cerotelium fici* on, in India, 551.
—, *Diplodia tubericola* can infect, 366.
— mosaic in U.S.A., 382.
—, *Phoma fici caricae* on, in S. Africa, 192.
—, *Physalospora rhodina* and *P. zeicola* can infect, 866.
—, *Stilbum cinnabarinum* on, in U.S.A., 456.

Fiji disease of sugar-cane, control, 787; factors affecting, 787; not occurring in the Argentine, 594; occurrence in Australia, 786; in Fiji, 786, 787; in Java, New Guinea, and the Philippines, 786; study on, 786; X-bodies in, 786; transmission of, by *Perkinsiella saccharicida*, 787; varietal resistance to, 787.
Fimetaria fimicola, translocation of protoplasm in, 776.
Fir, see *Abies*.
Fire injury in relation to decay of forest trees in U.S.A., 409.
Fish, *Saprolegnia parasitica* on, in U.S.A., 93.
— oil, effect of, on germination of *Alternaria solani* and *Venturia inaequalis*, 268.
— — -resin soap, use of, as an adhesive, with Burgundy mixture, 286, 435.
Flavescence of the vine, see Rougeau.
Flax (*Linum usitatissimum*), *Alternaria* on, from Austria, Canada, Holland, Russia, and U.S.A., 220.
—, *Asterocystis radicis* on, in relation to soil sickness, 221.
—, *Botrytis cinerea* f. *lini* on, in Holland, 372.
—, *Colletotrichum lini* on, in Austria and Canada, 220; in Holland, 220, 372; in Russia and U.S.A., 220; *Gloeosporium lini* and *C. linicolum* synonyms of, 220; study on, 221.
—, *Fusarium* (?) *herbarum* on, in Lithuania, 492.
—, — *lini* on, antigenic specificity of the globulin of, 372; genetics of resistance to, 95; occurrence in Austria and Canada, 220; in Holland, 220, 372; in Lithuania, 493; in Russia, 220; in U.S.A., 95, 220, 372; studies on, 95, 221; varietal resistance to, 95.
—, — *russianum* on, from Austria, Canada, Russia, and U.S.A., 220.
—, — *terrestris* on, in U.S.A, 221.
—, *Fusicladium lini* on, in Belgium, 677.
—, grey speck of, in Sweden, 19.
—, *Melampsora lini* on, heterothallism in, 362, 632; occurrence in Holland, 372; in U.S.A., 362, 632; varietal susceptibility to, 372.
—, *Phoma exigua* and *Pythium megalacanthum* on, in Holland, 372.
— sick soil in U.S.A., 220.
Flies, *Anulosporium nematogenum* on, in U.S.A., 762.
—, *Blastocystis hominis* in, in Italy, 508.
Fluorides, estimation of, in treating timber, 133.
Foeniculum vulgare, *Ramularia foeniculi* on, in Italy, 244.
Foliocellosis of orange, in Spain, 369.
Fomes annosus, in relation to H-ion concentration, 543, 738.
— — on deodar in India, 605.
— — on pine, factors affecting, 738; occurrence in France, 799; in Germany, 738; in Poland, 550; study on, 738.
— — on spruce in Germany, 738.
— — on timber in U.S.A., 740.
[*Fomes annosus*], *Trametes radiciperda* preferred as a name for, 738.
— *cryptarum* on timber in England, 669.
— *fomentarius*, decomposition of timber by, 343.
— (?) *fulvus* on orange in Tunis, 302.
— *igniarius* var. *nigricans*, use of cultural characters in identification of, 543.
— *lamaensis* and *F. lamaoensis* causing brown root disease, see *F. noxius*.
— — in forests in Malaya, 56.
— — var. *secedens*, 56.
— *lignosus* on cacao, 207; in the Belgian Congo, 80.
— — on coffee in the Belgian Congo, 80; (?) in the Ivory Coast, 91.
— — on *Hevea* rubber, control, 52, 54, 55; factors affecting, 52, 721; note on, 591; occurrence in the Belgian Congo, 80; in Ceylon, 591; in Malaya, 52, 54; in Sumatra, 720; pathogenicity of, 720; studies on, 52, 54, 720.
— *noxius*, mistaken for *F. lamaensis*, 55.
— — on cacao, 207; in Java, 425.
— — on coffee in India, 435; in Java, 286.
— — on *Hevea* rubber in (?) Africa, Ceylon, and Malaya, 55.
— — on nutmeg in Java, 425.
— — on oil palm in Malaya, 55, 354.
— (?) — on tea in Ceylon and Malaya, 55.
— *pachyphloeus*, non-pathogenicity of, in Malaya, 56.
— — var. *hispidus*, diagnosis of, 56.
— *pinicola* on timber, action of, 261.
— *rimosus* on pistachio nut in Russian Central Asia, 254.
— *robustus* on oak in France, 795.
— — f. *pinuum* on *Abies sibirica* and spruce in Russia, 666.
Foot rots of cereals, soil microbiological aspects of, 785.
Forest trees, diseases of, in Finland and Germany, 478.
— —, phytopathological examination of seeds of, 251.
Formaldehyde as a constituent of sublimoform, 305.
—, effect of, on growth of *Trichoderma lignorum*, 46.
— injury to seed grain, 153; to seed potatoes, 111; to seedlings, 643.
—, toxicity of, to *Ceratostomella fimbriata*, 462; to *Coniophora cerebella*, 261; to *Corticium solani*, 530; to *Merulius lacrymans*, 261.
—, use of, against *Actinomyces scabies* on potato, 389, 462; against *Aphanomyces raphani* on radish, 351; against *Bacterium tabacum* on tobacco, 473; against *Cladosporium cucumerinum* on cucumber, 485; against *C. fulvum* on tomato, 123; against *Corticium solani* on potato, 110, 530, 652; on tomato, 643; against damping-off organisms, 643; against *Didymella lycopersici* on tomato, 663; against flax soil sickness, 221; against *Fusarium* on rice, 720; against *F.*

angustum on cotton, 287; against *F. bulbigenum* on narcissus, 225; against *F. javanicum* var. *theobromae* on vegetable marrow, 197; against *F. orthoceras* on cotton, 287; against *F. oxysporum cubense* on banana, 381; against *F. vasinfectum* var. *inodoratum* on cotton, 287; against *Gibberella fujikuroi* on rice, 533; against *Helminthosporium gramineum* on barley, 162; against *Ophiobolus miyabeanus* on rice, 533; against *Phymatotrichum omnivorum* on cotton, 287; against *Phytophthora infestans* on potato, 110, 549; against *P. richardiae* on *Zantedeschia aethiopica*, 27; against *Piricularia oryzae* on rice, 533; against *Plasmodiophora brassicae* on swedes, 710; against *Pythium de Baryanum* on cauliflower, 709; against *Sclerotinia minor* on lettuce, 485; against *S. sclerotiorum* on cucumber, 417; on lettuce, 485; on tobacco, 730; against *Sclerotium rolfsii* on apple, 377; against *Septoria apii* on celery, 546; against *Sphaerotheca mors-uvae* on gooseberry, 451, 640; against *Thielaviopsis basicola* on *Primula obconica*, 514; against *Ustilago avena* on oats, 211; against *U. hordei* on barley, 622; against *U. kolleri* on oats, 211; against *U. nigra* on barley, 161; against wheat bunt, 559; as a soil disinfectant, 42, 268; as a timber preservative, 411; for the disinfection of greenhouses, 524.

[Formaldehyde] dust, use of, against *Corticium solani* and *Pythium ultimum* on tomato and other seedling diseases, 643; against tobacco seedling diseases, 356; against *Ustilago avenae* on oats, 614.

—, hot, use of, against *Actinomyces scabies* on potato, 462, 651, 652; against *Corticium solani* on potato, 651, 652.

— gas pastilles, use of, against storage diseases of fruit, 178.

Formic acid, toxicity of, to *Sclerotinia cinerea* and *Trichothecium roseum*, 523.

Fourth disease of sugar-cane, chlorotic streak identical with, 723; notes on, 554, 593; occurrence in Java, 593; in Mauritius, 554; in Porto Rico, 788; in Queensland, 245; pseudo-leaf scald identical with, 723; pseudo-streak identical with, 245; varietal susceptibility to, 554, 593.

Fowl, species of Aspergillaceae on the, in U.S.A., 270.

—, *Aspergillus fumigatus* on the, in Canada, 372.

—, *Candida albicans*, *C. krusei*, and *Oospora lactis* on the, in U.S.A., 371.

Fragaria vesca, see Strawberry.

Fraxinus, see Ash.

Frenching of tobacco in U.S.A., 205.

Frost damage in relation to permanent defoliation of larch in England, 342.

Fruit blight of raspberry in Canada, 678.

— disease control in Europe, 27; in Germany, 295, (in storage) 178; in Tasmania, 177; in U.S.A., 516, 699.

[Fruit], orchard factors affecting storage quality of, 295.

— spot of olives (non-parasitic) in Italy, 458.

Fumago on orange in Palestine, 284.

Fungal tissue as a source of nitrogen to soil micro-organisms, 533.

Fungan, use of, against *Venturia inaequalis* on apple, 450; against *V. pirina* on pear, 451.

Fungi, list of, from the American tropics, 396; in Balearic Islands, 789; in China, 247, 396, 661, 724, 725; in Iberian Peninsula, 789; in Iceland, 469; in Japan, 596, 726; in Morocco, 395; in Peking soils, 656; in the Philippines, 248; in Porto Rico, 246; in Portugal, 725; in Spain, 330; in Sweden, 329; in the Virgin Islands, 246; on fibre plants in Russia, 631. (See also Plant diseases.)

— on *Amoeba verrucosa*, 761.

—, relative distribution of, and phanerogams, 579.

—, spores of, in the upper air in U.S.A., 385.

Fungicides, analyses of American, 708.

—, determination of the dosage of, 577.

—, legislation regulating the sale of, in French Morocco and Latvia, 128; in Spain, 127.

—, method of testing of, in the laboratory, 194; of testing adhesiveness of, 577; of testing physical properties of, 232.

—, use of 'toxicity surfaces' in tests of, 710.

Furfural, use of, as a timber preservative, 411.

Fusarioses of cereals in Austria, 623.

Fusariosis of chilli in Spain, 354.

Fusarium in air of apple orchards in England, 32.

— in soil in China, 656; in Czecho-Slovakia, 535; in Siberia, 191.

— on *Agropyron repens* and *A. tenerum* in Canada, 621.

— on alpine plants in Italy, 449.

— on apple in England, 353.

— on aster (China) in Greece, 470; in Japan, 448.

— on avocado pear in Brazil, 707.

— on banana in Australia, 40.

— on barley in Germany, 150, 157.

— on *Bromus inermis* in Canada, 621.

— on cacao in England, 149.

— on carnation in Greece, 470.

— on carrot in U.S.A., 4.

— on celery in U.S.A., 357, 416.

— on cereals, method of testing fungicides against, 755; note on, 503; occurrence in Germany, 277, 502, 755; in Siberia, 191.

— on *Cinchona* in Indo-China, 147.

— on citrus in Sierra Leone, 553.

— on coffee in Indo-China, 148.

— on cotton, 566; in India, 567.

— on *Crotalaria striata* in Uganda, 422.

— on dahlia in Austria, 26.

— on *Fegatella conica* in Italy, 235.

[*Fusarium*] on fruit trees in Italy, 640.
— on *Kentia* in U.S.A., 79.
— on maize, breeding against, 13; occurrence in the Caucasus, 505; in Kenya, 9, 13; study on, 505.
— on *Matthiola* in Greece, 470.
— on melon in Spain, 354.
— on oil palm in Sierra Leone, 553.
— on onion, factors affecting, 317, 614; effect of ultra-violet rays on, 317; occurrence (?) in Russia, 610; in U.S.A., 613.
— on peach in U.S.A., 378.
— on peas in U.S.A., 413, 547; regarded as secondary to bacteria, 412.
— on *Phoenix canariensis* and *P. reclinata* in U.S.A., 79.
— on plantain in Ceylon, 77.
— on potato in Austria, 187; in Cyprus, 323.
— on raspberry in Holland, 705.
— on rice, control, 266, 720; notes on, 11; occurrence in British Guiana, 11; in India, 266, 719; in Indo-China, 146; study on, 719; varietal resistance to, 266, 720.
— on rye in Germany, 150.
— on strawberry in U.S.A., 680.
— on sugar-cane in Java, 724.
— on sunflower in Russia, 571.
— on sweet potato in Uganda, 422.
— on tea in Indo-China, 147.
— on tobacco in U.S.A., 145.
— on tomato in Trinidad, 121, 794.
— on vine in Italy, 745.
— on watermelon in S. Australia, 142.
— on wheat, effect of, on viability of grain, 160; factors affecting, 157; grasses as hosts of, 621; occurrence in Germany, 150, 157; in Siberia, 160.
—, production of arsenical gas by, 384.
— *acuminatum* on tomato in Germany, 662.
— *angustum* on cotton in Egypt, 286.
— *anisophilum* imperfect stage of *Nectria anisophila*, 437.
— *annuum* on chilli in U.S.A., 748.
— *anthophilum* on *Scabiosa succisa* in France, 292.
— *aquaeductum* in water in England and Ireland, 58.
— — on banana, 39.
— *argillaceum*, effect of ultra-violet rays on, 317.
— *batatatis vanillae* on vanilla in Porto Rico, 246.
— *bulbigenum*, effect of ultra-violet rays on, 317.
— — on narcissus in England, 224.
— *cepae*, effect of ultra-violet rays on, 317.
— — on onion in Russia, 610; in S. Africa, 135; in U.S.A., 614; varietal susceptibility to, 614.
— *coeruleum*, effect of ultra-violet rays on, 317.
— — on potato, induced parasitism of, to apple, 184.
[*Fusarium*] *conglutinans*, effect of ultra-violet rays on, 317.
— — on cabbage in U.S.A., 608, 740.
— — var. *callistephi* on aster (China), control, 374; occurrence in Italy, 373; in U.S.A., 79, 448; pathogenicity of, 448; study on, 373; varietal resistance to, 79, 374, 448.
— — var. *majus* on aster (China) in Europe, 448; in S. Africa, 175.
— *culmorum*, antagonism of *Trichoderma lignorum* to, 534.
— —, effect of ultra-violet rays on, 317.
— — in soil in Canada, 534.
— — on aster (China) in Germany, 633.
— — on barley in Canada, 502.
— — on cereals in France, 157; in Germany, 502.
— — on oats in Canada, 502.
— — on wheat, factors affecting, 502, 684; loss of virulence of, 684; mixed inoculations with, 684; occurrence in Canada, 502, 684; in Germany, 158.
— *dianthi* on aster (China) in Germany, 633.
— — on chrysanthemum in Belgium, 677.
— *discolor* in soil in Czecho-Slovakia, 535.
— *euoxysporum* synonym of *F. oxysporum*, 241.
— *fructigenum*, see *F. lateritium* var. *fructigenum*.
— (?) *herbarum* on flax in Lithuania, 492.
— — on rye in Germany, 278.
— — on wheat in Germany, 278.
— *javanicum* var. *theobromae*, effect of ultra-violet rays on, 317.
— — — — on vegetable marrow in S. Africa, 197.
— *lateritium* on banana in Trinidad, 382.
— — on citrus and raspberry, specialization in, 99.
— — var. *fructigenum* on apple, factors affecting, 32, 184; specialization in, 99, 184.
— — — — on China aster in Europe, 448.
— — — — on citrus and *Salix*, specialization in, 99.
— — — —, saltation in, 782.
— — — —, zonation in, 781.
— *lini* in soil in China, 656.
— — on flax, antigenic specificity of the globulin of, 372; genetics of resistance to, 95; occurrence in Austria and Canada, 220; in Holland, 220, 372; in Lithuania, 493; in Russia, 220; in U.S.A., 95, 220, 372; studies on, 95, 221; varietal resistance to, 95.
— *lycopersici* on tomato, breeding against, 12; control, 403, 644, 732; effect of, on transpiration, 714; of root extracts on enzymes of, 79; losses caused by, 403; occurrence in New S. Wales, 732; in New Zealand, 403; in S. Africa, 142; in U.S.A., 12, 79, 121, 206, 644; study on, 714; toxic action of, 315, 387, 714; varietal resistance to, 12, 142, 206, 732.

[*Fusarium*] *martii phaseoli* on bean in U.S.A., 71.
— — var. *pisi* on peas in U.S.A., 609.
— *merismoides* var. on peas in U.S.A., 263, (?) 412.
— *moniliforme*, see *Gibberella moniliformis*.
— — var. *conglutinans* on maize in Kenya, 9.
— — — *majus* can infect barley, 590.
— — — —, not accepted as conidial stage of *Gibberella fujikuroi*, 590.
— — — —, specialization in, 719.
— — — *subglutinans* on banana in Trinidad, 382.
— *neoceras*, effect of ultra-violet rays on, 317.
— *niveum*, antagonism of bacteria to, 109.
— — on melon, formation of tyloses caused by, 418; occurrence in U.S.A., 269, 418, (?) 744; study on, 744; varietal resistance to, 269.
— — on watermelon, breeding against, 424; dissociation in, 423; factors affecting, 197; notes on, 744; occurrence in Italy, 838; in U.S.A., 197, 423, 495, 744; study on, 197; toxic action of, 423; varietal resistance to, 423, 495.
— *orthoceras*, effect of ultra-violet rays on, 317.
— — on cotton in Egypt, 286.
— — var. *pisi* on broad bean in U.S.A., 71.
— — — — on peas, control, 71; factors affecting, 71; nature of resistance to, 412; occurrence in U.S.A., 71, 412, 609; study on, 71; varietal resistance to, 71, 609.
— — — — on vetch in U.S.A., 71.
— *oxysporum*, effect of ultra-violet rays on, 317.
— — in soil in Czecho-Slovakia, 535; in Siberia, 191.
— — on almond and apricot in Greece, 469.
— — f. 6 on aster (China) in Europe, 448.
— — on broad beans in Greece, 469.
— — on cereals in Siberia, 191.
— — on cherry in Greece, 469.
— — on elm in U.S.A., 125.
— (?) — on iris in U.S.A., 374.
— — on onion, pear, and pistachio nut in Greece, 469.
— — on potato, metabolism of, 531; occurrence in England, 241; in Greece, 469; studies on, 241, 531; *F. euoxysporum* synonym of, 241; toxic action of, 531.
— — on tomato in Greece, 469.
— —, physiologic specialization in, 99.
— — *cubense* on banana, breeding against, 39, 104, 303; control, 38, 303, 381; factors affecting, 38; legislation against, in Mexico and other countries, 303; losses caused by, 39; occurrence in the Canary Islands, 381, 773; in India, 267; in Jamaica, 38, 104; in Mexico, 303; studies on, 38, 381; varietal resistance to, 303, 381.
[*Fusarium oxysporum cubense*] on plantain in Ceylon, 77.
— — var. *nicotianae*, effect of ultra-violet rays on, 317.
— *redolens*, effect of ultra-violet rays on, 317.
— *russianum* on flax from Austria, Canada, Russia, and U.S.A., 220.
— *sambucinum*, effect of ultra-violet rays on, 317.
— *scirpi* var. *compactum* on elm in U.S.A., 125.
— *semitectum*, effect of ultra-violet rays on, 317.
— — var. *majus* on banana, 39.
— *solani* can infect potato, 136.
— — in soil in Czecho-Slovakia, 535.
— — on onion in S. Africa, 135.
— — var. *medium*, effect of ultra-violet rays on, 317.
— *sporotrichioides*, effect of ultra-violet rays on, 317.
— *terrestris* on flax in U.S.A., 221.
— *tracheiphilum* on *Crotalaria striata* in Uganda, 422.
— *vasinfectum* on cotton, breeding against, 508; factors affecting, 439, 567, 714; notes on, 93; occurrence in India, 439, 508, 566; in U.S.A., 92; physiologic forms of, 567; study on, 714; toxic action of, 315, 387, 714; varietal resistance to, 508, 566.
— —, saltation in, 782.
— — var. *inodoratum* on cotton in Egypt, 286.
— — — *zonatum*, effect of ultra-violet rays on, 317.
— — — — on onion in U.S.A., 269, 614.
— *zonatum*, see *F. vasinfectum* var. *zonatum*.
Fusicladium in air of apple orchards in England, 32.
— *dendriticum* var. *eriobotryae* on loquat in New S. Wales, 231.
— *lini* on flax in Belgium, 677.
— *saliciperdum* on *Salix* in U.S.A., 251. (See also *Venturia chlorospora* on.)
Fusicoccum araucariae, *Cryptosporella araucariae* perfect stage of, 63.

Gaillardia, *Phoma gaillardiae* on, in S. Africa, 764.
Ganoderma applanatum, decomposition of wood by, 343.
— —, *G. testaceum* and *G. tornatum* regarded as varieties of, 116.
— — on beech, 544.
(?) — — on coffee in India, 285.
— — on oil palm in the Belgian Congo, 80.
— —, revision of the group, 116.
— *australe*, disuse of name proposed, 116.
— *lucidum* on coco-nut in India, 76; in the Seychelles, 144.
— — on *Duranta plumieri* in Ceylon, 77.
— — on *Gliricidia maculata* in Ceylon, 77.
— — on plum in Kenya, 9.

[*Ganoderma*] *mastoporum*, *G. subtornatum* regarded as form of, 116.
— *pseudoferreum* on cacao, 207.
— — on *Hevea* rubber in Malaya, 54.
— — on tea in Java, 248.
— *subtornatum* regarded as form of *G. mastoporum*, 116.
— *testaceum* and *G. tornatum* regarded as varieties of *G. applanatum*, 116.
Gardenia, *Hemileia* on, in S. Africa, 169.
Garlic (*Allium sativum*), *Phoma terrestris* on, in U.S.A., 547.
Gas oil, see Oil, gas.
Gaudinia fragilis, *Puccinia glumarum* can infect, 273.
— —, — *graminis*, *P. lolii*, and *P. triticina* can infect, 274.
Gelatine, use of, as a spreader, 298; as a sticker, 305.
—, wetting capacity of, 305.
Gelatinosporium abietinum regarded as a *Micropera*, 131.
Geneva system of evaluating spraying treatments, 638.
Genistella on aquatic larvae in Alpine waters, 511.
— *ramosa* on *Baetis rhodani* in Alpine waters, 512.
Geotrichum immite, *Blastomycoides immitis* renamed, 171. (See also *Coccidioides immitis*.)
— *matalense* var. *chapmani* in a sewer in England, 117.
Germator seed disinfection apparatus now known as Miag, 430.
Germisan, composition of, 305.
—, cost of, 152.
—, determination of mercury in, 305; of mercury on seed-grain treated with, 152.
—, effect of, on germination of vegetable seeds, 264.
—, use of, against *Calonectria graminicola* on rye, 84, 152; against *Corticium solani* on potato, 110; against *Helminthosporium gramineum* on barley, 84, 152, 162; against *Plasmodiophora brassicae* on cabbage, 493; against *Pythium de Baryanum* on cauliflower, 709; against *Ustilago avenae* on oats, 84, 152; against wheat bunt, 17, 84, 152.
— short disinfection process, use of, against cereal diseases, 84.
Gerstenfusariol, determination of mercury in, 305.
Giant hill of potato in U.S.A., 48.
Gibberella fujikuroi can infect maize, 719; *Setaria italica*, 590.
— —, *Fusarium moniliforme* var. *majus* not accepted as conidial stage of, 590.
— — on barley, stimulatory effect of, 590.
— — on Gramineae in Japan, 590.
— — on maize and *Panicum miliaceum*, stimulatory effect of, 590.
— — on rice, control, 533; factors affecting, 533; occurrence in Japan, 532, 590, 719; specialization in, 719; stimulatory effect of, 590; studies on, 532, 590.
[*Gibberella fujikuroi*] on sorghum and sugar-cane, stimulatory effect of, 590.
— *moniliformis*, effect of X-rays on, 644; of ultra-violet rays on, 317.
— — on coffee in Porto Rico, 246.
— — on Gramineae in Japan, 590.
— — on maize, control, 12; dissemination of, 505; effect of, on germination, 505, 564; on yield, 564; factors affecting, 564; losses caused by, 12; occurrence in the Caucasus, 505; in Tanganyika, 201, 552; in U.S.A., 12, 564, 679; study on, 564.
— — on narcissus in England, 224.
— — on onion in U.S.A., 679.
— — on sugar-cane, notes on, 679; occurrence in Porto Rico, 326; in Queensland, 787; in Réunion, 328; in U.S.A., 679; varietal susceptibility to, 326, 328, 787.
— —, specialization in, 719.
— *saubinetii* can infect *Agropyron elongatum* and *A. repens*, 622; algae, 307; *Bromus ciliatus* and *B. inermis*, 622; oats, 622.
— —, effect of X-rays on, 644.
— — on aster (China) in Germany, 633.
— — on banana from Brazil and the Canaries, 39.
— — on barley in the Argentine, 683; in U.S.A., 614.
— — on cereals in the Argentine, 683.
— — on hops in France, 75.
— — on maize, control, 644, 683; dissemination of, 505; effect of, on germination, 505; factors affecting, 775; nature of resistance to, 432; note on, 313; occurrence in the Argentine, 683; in the Caucasus, 505; in Rhodesia, 775; in Tanganyika, 201, 552; in U.S.A., 432, 644.
— — on rye in the Argentine, 683.
— — on wheat, control, 683; factors affecting, 278, 620; method of infection by, 159, 621; occurrence in the Argentine, 683; in Belgium, 676; in Canada, 621; in New Zealand, 496; in U.S.A., 159, 620; studies on, 159, 620.
'Gilah' disease of tobacco in Sumatra, 471. (See also Leaf curl of.)
Ginger (*Zingiber officinale*), *Colletotrichum zingiberis* on, in Ceylon, 77; in Trinidad, 434.
—, *Corticium solani* on, in Ceylon, 77.
Ginkgo biloba, *Glomerella cingulata* and *Pestalozzia sinensis* on, in China, 725.
Ginseng (*Panax quinquefolium*), *Alternaria panax* on, in U.S.A., 657.
Gladiolus, *Bacterium marginatum* on, in U.S.A., 356.
—, *Puccinia gladioli* on, in Morocco, 469.
'Glasshouse streak' of tomato in Great Britain, 731; relation of, to tomato mosaic and stripe, 731.
Gliocladium fimbriatum and *G. penicilloides* in soil in China, 656.
Gliricidia maculata, *Ganoderma lucidum* on, in Ceylon, 77.

[*Gliricidia maculata*], *Nectria anisophila* on, in Costa Rica, 438.
Gloeodes pomigena on *Acer saccharum* in U.S.A., 298.
— — on apple, control, 517; host range of, 206, 299; occurrence in England, 488; in France, 517; in U.S.A., 298; study on, 299; varietal susceptibility to, 517.
— — on ash, *Asimina triloba*, and *Benzoin aestivale* in U.S.A., 206.
— — on blackberry, *Cercis canadensis*, *Cornus alternifolia*, and *C. rugosa* in U.S.A., 298.
— — on *Crataegus crus-galli* and *C. mollis* in U.S.A., 206.
— — on elm, *Liriodendron tulipifera*, and oak in U.S.A., 298.
— — on orange in S. Africa, 759.
— — on pear in England, 488.
— — on *Platanus occidentalis* in U.S.A., 206.
— — on plum in England, 488.
— — on *Pyrus coronaria*, *Salix nigra*, and *Sassafras variifolium* in U.S.A., 298.
— — on *Smilax hispida* in U.S.A., 299.
— — on *Vitis cordifolia* and *Xanthoxylum americanum* in U.S.A., 206.
Gloeosporium on apple in Switzerland, 8.
— on cassava in Sierra Leone, 202.
— on *Cinchona* in Indo-China, 147.
— on citrus in Sierra Leone, 553.
— on coco-nut in Indo-China, 148.
— *albo-rubrum* on *Hevea* rubber in Ceylon, 77.
— *ampelophagum* on vine, control, 6, 265; *Elsinoe ampelina* perfect stage of, 596; occurrence in China, 395; in Madagascar, 675; in New S. Wales, 265; in S. Africa, 6; term 'anthracnose' first applied to, 595; varietal resistance to, 6.
— *amygdalinum* on almond in S. Africa, 380.
— *begoniae* on begonia in Italy and N. America, 448.
— *citri* on orange in Portugal, 726.
— *cucurbitarum* synonym of *Colletotrichum lagenarium*, 418.
— *foliicolum* on orange in China, 396.
— *hesperidearum* on orange in Italy, 660.
— (?) *kawakamii* on *Daphniphyllum macropodium* in Italy, 375.
— *lagenarium*, see *Colletotrichum lagenarium*.
— *limetticolum* on citrus, legislation against, in Italy, 565.
— — on lime, breeding against, 22, 143; effect of, on yield, 689; occurrence in Bermuda, 421; in Dominica, 21; in St. Lucia, 689; in Trinidad, 143.
— *lini* synonym of *Colletotrichum lini*, 220.
— *manihotis* on cassava in Madagascar, 352; in Réunion, 680.
— *musarum*, action of certain volatile substances and gases on growth of, 46.
— — on banana, 39; in Australia, 40.
— — on plantain in Ceylon and India, 773.
[*Gloeosporium*] *nicolai* on *Scolopendrium vulgare* in France, 373.
— *nicotianae* on *Nicotiana rustica* in Germany, 477.
— *orbiculare* synonym of *Colletotrichum lagenarium*, 418.
— *pandani* on *Pandanus lambocensis* in Samoa, 98.
— *perennans* can infect apricot, cherry, *Crataegus*, peach, plum, *Pyrus aucuparia*, *P. rivularis*, and rose, 299.
— — on *Amelanchier alnifolia* in U.S.A., 299.
— — on apple, control, 702; *Eriosoma lanigera* in relation to, 701; factors affecting, 453, 701; occurrence in Canada, 701; in New Zealand, 179; in U.S.A., 453; studies on, 179, 701; varietal susceptibility to, 179, 702.
— — on quince in U.S.A., 299.
— —, toxicity of malachite green to, 299.
— *piperatum*, see *Glomerella cingulata*, 724.
— *rosae* on rose (a *nomen nudum*), 447.
— *somalense* on *Sansevieria robusta* in Somaliland, 536.
— *venetum*, see *Elsinoe veneta*.
Glomerella cingulata, antagonism of bacteria to, 109.
— — on apple, control, 100, 709; occurrence in Ceylon, 77; in U.S.A., 100, 709.
— — on avocado pear in Brazil, 707.
— — on chilli in China, 724.
— — on citrus in Italy, 746.
— — on coffee, notes on, 8; occurrence in the Belgian Congo, 760; in Java, 760; in Kenya, 8; saltation in, 8; strains of, 8.
— — on *Ginkgo biloba* in China, 725.
— — on mango in the Philippines, 521.
— — on orange in Tunis, 302.
— — on tomato in Trinidad, 121.
— —, toxicity of hydrophilic colloidal sulphur to, 356.
— *gossypii* on cotton, 566; in China, 395.
Gloxinia, *Botrytis*, *Moniliopsis*, *Phytophthora*, and *Pythium* on, in Germany, 97.
Glyceride oils, use of, with Bordeaux mixture, 576, 774.
Glycine, see Soy-bean.
'Gnarled' canker of tea in Nyasaland, 9, 332; stem canker renamed, 9.
Gnomonia erythrostoma on cherry in Switzerland, 314.
(?) — *leptostyla* on butternut and walnut in U.S.A., 251.
— *rubi* on rose in England, 447.
— *ulmea* on elm in U.S.A., 251.
— *veneta* on *Platanus*, control, 251; *Discula platani* and *Gloeosporium nerviseguum* stages of, 735; factors affecting, 735, 796; occurrence in France, 796; in Italy, 735; in U.S.A., 251; study on, 735.
Gold leaf disease of strawberry in U.S.A., 494.
Gooseberry (*Ribes grossularia*), *Botrytis* on, in Holland, 705.
—, *Corticium centrifugum* on, in Belgium, 8.

[Gooseberry], *Cronartium ribicola* on, 381; in Canada, 480.
—, *Helicobasidium purpureum* on, in England, 353.
— leaf scorch in Austria, 302; in Germany, 773.
—, *Mycosphaerella grossulariae* on, in Denmark, 640.
—, *Pseudopeziza ribis* on, control, 573, 640, 773; factors affecting, 302; occurrence in Austria, 302; in Denmark, 640; in Germany, 773; in U.S.A., 573.
—, *Puccinia pringsheimiana* (*P. ribesii-caricis*) on, in Denmark, 640; in Germany, 381.
—, *Sphaerotheca mors-uvae* on, breeding against, 519; control, 451, 640; occurrence in Denmark, 640; in Germany, 519, 578; in Holland, 705; in Switzerland, 451.
—, *Verticillium albo-atrum* on, in Germany, 117.
Gordonia, *Exobasidium monosporum* on, in Japan, 698.
Gossypium, see Cotton.
Gradocol collodion membranes, use of, in estimating the size of virus particles, 646.
Gramineae, *Gibberella fujikuroi* and *G. moniliformis* on, in Japan, 590.
—, see also Grasses.
Granosan, English equivalent of the American ceresan, 140.
—, toxicity of, to *Corticium solani*, 214.
—, use of, against *Bacterium malvacearum* on cotton, 421; against cereal and cotton diseases, 214; against *Fusarium* on rice, 720; against *Phoma lingam* on swedes, 140; against *Ramularia foeniculi* on *Foeniculum vulgare*, 245.
Grapefruit (*Citrus decumana*), cold storage spot of, in U.S.A., 565.
—, *Colletotrichum gloeosporioides* on, in India, 369.
—, *Diplodia* (?) *natalensis* on, in Ceylon, 77.
—, — *tubericola* can infect, 366.
—, gummosis of, in Sierra Leone, 553.
—, *Nematospora coryli* on, in U.S.A., 594.
—, *Oidium tingitaninum* on, in Ceylon, 167.
—, *Physalospora rhodina* and *P. zeicola* can infect, 366.
—, *Pseudomonas citri* on, in Ceylon, 433.
—, *Rhizoctonia lamellifera* on, in Rhodesia, 727.
—, *Sporotrichum citri* on, in Jamaica, 166; in Sierra Leone, 202.
Graphiola phoenicis on date palm and *Phoenix canariensis* in U.S.A., 270.
Graphium on pine in Japan, 606.
— on timber in U.S.A., 669.
— *phycomyces* synonym of *Leptographium phycomyces*, 409.
Grasses, (?) *Calonectria graminicola* on, in England, 754.
—, *Claviceps purpurea* in seed samples of, in Denmark, 294.
—, *Corticium solani* on, in Holland, 781; in S. Australia, 159.
[Grasses], *Helminthosporium sativum* on, in the Argentine, 683.
—, *Lagena radicicola* on, in Canada, 749.
—, mosaic of, affecting sugar-cane in the Philippines, 245.
—, mycorrhiza of, in Italy, 309.
—, *Ophiobolus graminis* on, in Kenya, 9.
—, *Puccinia glumarum* and *P. graminis* on, transmitted from wheat, 273.
—, — *lolii* can infect, 274; occurrence in France, 177.
—, — *secalina* and *P. triticina* can infect, 274.
—, *Pythium epigynum* can infect, 331.
—, sclerotial fungi on, in U.S.A., 367.
—, see also Gramineae, Turf.
'Greasy spot' of orange in Italy, 746.
Grenz rays, effect of, on certain dermatophytes, 694.
Grevillea, *Rhizoctonia lamellifera* on, in Uganda, 727.
— *robusta*, *Armillaria mellea* on, in S. Africa, 142; in Tanganyika, 201.
Grey speck of barley and flax in Sweden, 19.
— — of oats in Germany, 87; in Sweden, 19.
— — of root crops and wheat in Sweden, 19.
Groundnut (*Arachis hypogaea*), *Cercospora* on, in U.S.A., 357.
—, — *personata* on, in China, 395.
—, *Corticium sasakii* on, in Japan, 331.
—, *Puccinia arachidis* on, in Porto Rico, 246; *Uromyces arachidis* synonym of, 246.
— rosette in the Gambia, 5; in S. Africa and Uganda, 143.
—, *Sclerotium rolfsii* on, in U.S.A., 357.
'Growth failure' of sugar-cane in Hawaii, 723.
Guignardia aesculi on *Aesculus* spp. and horse-chestnut in U.S.A., 251.
Guizotia abyssinica, *Macrophomina phaseoli* can infect, 267.
Gum ghetti as a wetting agent, 182.
— spot of orange in Italy, 746, 759.
Gummosis of apricot, control, 180; notes on, 181; occurrence in Egypt, 749; in Germany, 180; in Italy, 639.
— of cherry in Germany, 180.
— of citrus, control, 494; occurrence in Ceylon, 77; in Egypt, 749; in U.S.A., 494.
— of grapefruit and lemon in Sierra Leone, 553.
— of orange in Italy, 639, 759.
— of peach, control, 180; notes on, 181; occurrence in Egypt, 749; in Germany, 180; in Italy, 639.
— of plum in Egypt, 749; in Germany, 180.
— of stone fruits in Hungary, 575.
Gymnoconia interstitialis on blackberry in U.S.A., 706.
— — on raspberry in U.S.A., 104, 706.
Gymnosporangium germinale can infect *Crataegus arnoldiana*, *C. beata*, *C. brainerdi*, *C. filipes*, *C. holmesiana*, *C. oxyacantha*, and *C. tomentosa*, 704.

[*Gymnosporangium germinale*] on apple, factors affecting, 100, 704 ; notes on, 452 ; occurrence in U.S.A., 100, 423, 452 ; varietal susceptibility to, 423, 452.
— — on *Juniperus virginiana* and quince in U.S.A., 704.
— *globosum* on apple in U.S.A., 100, 423.
— — on *Juniperus virginiana* in U.S.A., 704.
— *juniperi-virginianae* on apple, factors affecting, 100 ; occurrence in U.S.A., 100, 423, 452 ; varietal resistance to, 423, 452 ; viability of, 100.
— — on *Juniperus virginiana* in U.S.A., 704.
— *koreaense* on *Juniperus chinensis* and pear in China, 396.
— *yamadae* on apple and *Juniperus chinensis* in China, 396.
Gypsophila paniculata, bacterium on, in U.S.A., 224.
Gypsum, use of, against *Sorosporium reilianum* on maize, 568 ; as a filler for dusts, 271, 272.

H 19 virus of potato, 587.
Hadrotrichum populi var. *arbuti* synonym of *Sphaceloma mattirolianum*, 661.
—*virescens* on *Agrostis alba* in Poland, 550.
Hafertillantin contains no mercury, 806.
Hanging drop method, modification of, 233.
Hantzschia phycomyces renamed *Leptographium phycomyces*, 409.
Haplosphaeria deformans on loganberry in Canada, 772.
Haplosporella nervisequa on elm in Germany, 666 ; *Sphaeropsis nervisequa* renamed, 666.
'Healthy potato virus', see Potato, 'healthy potato' virus of.
Heart necrosis of potato in Italy, 784.
— rot of banana in Queensland, 201.
— — of beet, see Dry rot of.
Hedera helix, see Ivy.
Helianthus annuus, see Sunflower.
Helichrysum bracteatum, curly top of beet affecting, in U.S.A., 446.
— —, yellows of, in U.S.A., 446 ; transmission of, by *Cicadula sexnotata* to aster and celery, 446.
Helicobasidium compactum on *Hevea* rubber in Java, 425.
— (?) — on tea in Nyasaland, 9.
— *purpureum* on apple in England, 353.
— — on beet, control, 135 ; notes on, 348 ; occurrence in Austria, 135 ; in Czecho-Slovakia, 348, 546.
— — on *Cicer arietinum* in Italy, 746.
— — on gooseberry in England, 353.
Helicoma echinosporium on rice in Japan, 533.
Helminthosporium on *Agrostis* in U.S.A., 356.
— on *Cynodon dactylon* in S. Africa, pycnidial production by, 163.
— on *Eleusine coracana* in Ceylon, 77.
— on wheat in France, 275.
—, saltation in, 584, 782.
[*Helminthosporium*] *avenae*, effect of ultra-violet rays on sporulation of, 504.
— — on oats, control, 163 ; occurrence in Great Britain, 162 ; in Ireland, 266 ; in Scotland, 163 ; pycnidial production by, 162 ; study on, 163 ; varietal susceptibility to, 163.
— *cactacearum* on *Cereus grusonianus*, *C. senilis*, and other spp. in Italy, 27.
— (?) *gigasporum* subsp. *javanicum* on sesame in Tanganyika, 552.
— *gramineum*, antagonism of bacteria to, 109.
— — on barley, control, 16, 84, 152, 162 ; damages for negligence in controlling, 161 ; effect of, on host, 209 ; factors affecting, 162 ; losses caused by, 161 ; method of inoculating, 162 ; occurrence in Austria, 16 ; in Germany, 84, 152, 161, 209 ; in Great Britain, 162 ; in U.S.A., 614 ; pycnidial production by, 162 ; study on, 162 ; varietal resistance to, 162, 614.
— *heveae* on *Hevea* rubber in Java, 425.
— *inaequalis*, antagonism of bacteria to, in mixed cultures, 109.
— *inconspicuum* on rye in Italy, 660.
— *maydis* on maize in the Caucasus, 505.
— *monoceras*, nature of saltation in, 782.
— *ocellum* on sugar-cane in Hawaii, 722.
— *oryzae* on rice in Indo-China, 146.
— *pedicellatum*, nature of saltation in, 782.
— *sacchari* on banana, 39.
— *sativum*, antagonism of, to *Ophiobolus graminis*, 684 ; of *Trichoderma lignorum* to, 534.
— — can infect *Bromus ciliatus* and oats, 621.
— — in soil in Canada, 534.
— — on *Agropyron repens*, *A. richardsonii*, and *A. tenerum* in Canada, 621.
— — on barley in the Argentine, 683 ; in U.S.A., 755.
— — on *Bromus inermis* in Canada, 621.
— — on cereals, saltation of, effect of ultra-violet rays on, 560.
— — on grasses and rye in the Argentine, 683.
— — on wheat, control, 161, 683 ; factors affecting, 161, 683, 684 ; grasses as hosts of, 621 ; loss of virulence of, 684 ; methods of inoculating, 561 ; mixed inoculations with, 684 ; occurrence in the Argentine, 683 ; in Canada, 561, 621, 684 ; in Kenya, 9 ; in Siberia, 160 ; studies on, 160, 561.
— —, saltation in, 561, 755.
— *sesami* on sesame in Italy, 660.
— *sigmoideum*, stage of *Leptosphaeria salvinii*, 392.
— — on rice in Indo-China, 146.
— *stenospilum* on sugar-cane in Hawaii, 722.
— *teres* on barley in England and S. Africa, pycnidial production by, 163.
— *torulosum* on banana, 39 ; in Sierra Leone, 552.

[*Helminthosporium*] *turcicum* on maize in the Caucasus, 505 ; in Kenya, 13.
Helopeltis bergrothi as cause of tea canker in Nyasaland, 332.
Hemicelluloses, decomposition of, in plant materials in soil, 393.
Hemileia on *Gardenia*, *Vangueria infausta*, and *V. pygmaea* in S. Africa, 169.
— *vastatrix* on coffee, control, 286, 435, 436, 552; factors affecting, 285, 436; incubation period of, 285; notes on, 169, 436; occurrence in India, 285, 435, 436; in S. Africa, 142, 169; in Tanganyika, 552; study on, 285; varietal susceptibility to, 142.
Hemispora stellata on man in Germany, 444.
Hemp (*Cannabis sativa*), *Cercospora cannabis* on, in China, 395.
—, fungi on, in Russia, 631.
—, *Sclerotium rolfsii* on, in India, 612.
Hendersonia on avocado pear in Brazil, 707.
— *boehmeriae* on *Boehmeria nivea* in Russia, 632.
— *eriobotryae* on loquat in Italy, 641.
— *rosicola* on rose in Brazil, 447.
— *rubi* on raspberry in Holland, 705.
Hepatica acutiloba, *Aecidium punctatum* on, in U.S.A., 388.
Hercynia neutral, composition of, 32.
— —, use of, against *Venturia inaequalis* on apple, 32, 297.
Hertzian waves, effect of, on *Bacterium tumefaciens* on *Pelargonium*, 82.
Hesperis lutea, *Plasmodiophora brassicae* on, in Russia, 346.
Heteroptera, (?) transmission of *Nematospora coryli* and *N. gossypii* on cotton in S. Africa by, 438.
(?) *Heterosporium* on *Phaseolus mungo* var. in Nyasaland, 10.
— on *Prunus laurocerasus* in Switzerland, 97.
Hevea brasiliensis, see Rubber.
Hexylresorcinol, toxicity of, to ringworm fungi, 509.
Hibiscus cannabinus, *Ascochyta hibiscicannabini* on, in Russia, 632.
— —, fungi on, in Russia, 631.
— *diversifolius*, *Colletotrichum* on, in India, 267.
— *esculentus*, *Oidiopsis* on, in Cyprus, 747.
— —, *Peronospora* (?) *parasitica* on, in Ceylon, 77.
— —, *Verticillium dahliae* can infect, 470.
— *sabdariffa*, *Rhodochytrium spilanthidis* on, 397.
Hickory (*Carya*), *Aleurodiscus oakesii* on, in U.S.A., 601.
—, bacterial disease of, in U.S.A., 601.
—, *Coniosporium corticale* on, in U.S.A., 174.
Hides, *Hormodendrum*, *Monilia*, and *Penicillium* on, in U.S.A., 94.
Hieracium venosum, intumescences on, in U.S.A., 529.
Hippeastrum, *Phyllosticta* on, in U.S.A., 80.
—, *Stagonospora curtisii* can infect, 79.
Hippophaë rhamnoides, *Actinomyces* on, and root nodules of, in Germany, 649.
Höchst dust, see Tillantin.
Holcus lanatus, *Tilletia holci* on, in Denmark, 294.
Holder spraying apparatus, 436.
Hollow core of citrus in Italy, 746.
Hollyhock (*Althaea*), *Puccinia malvacearum* on, cytology of, 782.
Hoodia, *Triposporium stapeliae* on, in S. Africa, 764.
Hops (*Humulus lupulus*), chlorotic disease of, in England, 242.
—, *Gibberella saubinetii* on, in France, 75.
—, mosaic of, legislation against, in Australia, 336; occurrence in England, 111, 242; (?) in U.S.A., 656, symptomless carriers of, 242; varietal resistance to, 111.
—, nutritional deficiencies in, 785.
—, *Pseudoperonospora humuli* on, breeding against, 326; control, 111, 242, 325, 326, 354, 722, 774; factors affecting, 326; germination of oospores of, 656; incubation period of, 111; legislation against, in Australia, 336; in Norway, 528; notes on, 111, 112, 354, 656; occurrence in Canada, 111, 325; in Czecho-Slovakia, 326; in England, 111, 354, 774; in France, 111; in Germany, 242, 578, 722; in U.S.A., 111, 325, 656; seedling infection by, 111, 325; studies on, 325, 656; varietal susceptibility to, 111.
—, 'small hop' disease of, in England, 112.
Hordeum bulbosum, *Puccinia anomala*, *P. graminis*, and *P. triticina* can infect, 274.
— *jubatum*, *Erysiphe graminis* on, 362.
— —, *Ophiobolus graminis* can infect, 621.
— —, *Puccinia glumarum* can infect, 273; occurrence in Canada, 83.
— —, — *graminis* on, in U.S.A., 556.
— *maritimum*, *Puccinia anomala* can infect, 274.
— —, — *glumarum* can infect, 273.
— —, — *graminis*, *P. lolii*, *P. secalina*, and *P. triticina* can infect, 274.
— *murinum*, *Erysiphe graminis* on, 362.
— —, *Ophiobolus graminis* on, in the Argentine, 683.
— *pusillum*, *Puccinia graminis* on, in U.S.A., 556.
— *secalinum*, *Puccinia graminis* can infect, 274.
— *vulgare*, see Barley.
Hormiscium on timber in U.S.A., 669.
Hormodendrum on hides in U.S.A., 94.
— on timber in U.S.A., 669.
— *cladosporioides*, *H. olivaceum*, and *H. pallidum* in soil in China, 656.
— *rossicum* on man in Russia, 289.
Hormonema pullulans in the air at wood pulp mills in Norway, 69.
Horse, *Cryptococcus farcinimosus* on the, in the Sudan, 172.
—, *Rhinosporidium* (?) *seeberi* on the, in India, 568.
Horse-chestnut (*Aesculus hippocastanum*),

Bacterium rhizogenes on, effect of, on root formation, 554.
[Horse-chestnut], *Guignardia aesculi* on, in U.S.A., 251.
— —, *Verticillium albo-atrum* on, in Germany, 117.
Horse-radish (*Cochlearia armoracia*), mosaic of, in U.S.A., 351; transmission of, to mustard and turnip, 852.
Hot-water seed treatment, fungicidal action of, 500.
— — — — against *Fusarium* on rice, 720; against *Piricularia oryzae* on rice, 533; against *Septoria apii* on celery, 744; against *Ustilago nuda* on barley, 614; against *U. tritici* on wheat, 499.
— — treatment for sugar-cane setts against chlorotic streak, 245, 722.
— —, use of, for disinfection of pots, 42.
Houseburn of tobacco in U.S.A., 118.
Huernia, Triposporium stapeliae on, in S. Africa, 764.
Humulus japonicus, beet curly top virus can infect, 447.
— *lupulus*, see Hops.
Hy. II. Hy. III, and Hy. IV virus diseases of *Hyoscyamus niger* in England, 243; protective inoculation against (virus IV), 582; transmission of Hy. II and Hy. III by *Myzus persicae*, 243; to various hosts, 243.
Hyacinth (*Hyacinthus*), *Pseudomonas hyacinthi* on, legislation against, in Germany, 514; study on, 514.
Hyalopterus atriplicis transmitting bean mosaic in U.S.A., 414.
Hyalopus crystallinus in soil in Austria, 191.
Hydrangea, *Microsphaera polonica* on, ascigerous stage of *Oidium hortensiae*, 550; control, 175, 642; occurrence in Germany, 578, 642; in Poland, 550; in Switzerland, 175.
—, *Oidium hortensiae* on, see *Microsphaera polonica* on.
Hydrochloric acid, toxicity of, to *Penicillium expansum*, 226.
— —, use of, against wood-staining fungi, 669.
— — with mercuric chloride, use of, against *Actinomyces scabies* on potato, 652; against *Corticium solani* on potato, 651, 652; against *Plasmodiophora brassicae* on rape, 412.
— — with zinc chloride, use of, against *Bacillus amylovorus* on pear, 357.
Hydrogen cyanide, effect of, on growth of *Trichoderma lignorum*, 46.
— -ion concentration in relation to *Achorion schoenleini*, 569; to *Actinomyces scabies*, 189, 321, 652, 717; to *Ascochyta pisi*, 483; to *Bacterium aleuritidis*, 180; to *Bact. pisi*, 263; to *Bact. solanacearum*, 145; to *Bact. tumefaciens*, 148; to (?) *Calonectria graminicola*, 755; to chlorosis of rose, 373; to *Colletotrichum* on cotton, 267; to the composition of Burgundy mixture, 711; to *Corticium solani*, 159 214; to damping-off of soy-bean, 110; to *Fomes annosus*, 543, 738; to *Fusarium conglutinans* var. *majus*, 176; to *F. lycopersici*, 315; to *F. solani*, 136; to *F. vasinfectum*, 315; to *Gloeodes pomigena*, 299; to little leaf of fruit trees, 99; to *Leptothyrium nervisedum*, 798; to *Macrophomina phaseoli*, 267; to magnesium deficiency of potato, 654; to *Malassezia furfur*, 569; to *Mycosphaerella tabifica*, 549; to *Ophiobolus graminis* and organisms antagonistic to it, 685; to *Penicillium digitatum* and *P. italicum*, 167; to *P.* spp. and their production of an inhibitory substance, 387; to *Phomopsis tuberivora*, 241; to *Phyllosticta solitaria*, 701; to *Phytomonas viridiflava* var. *concentrica*, 348; to *Phytophthora paeoniae*, 176; to *Plasmodiophora brassicae*, 493; to *Plenodomus meliloti*, 635; to *Polystictus benzoinus* and *P. zonatus*, 543; to potato leaf roll, 239; to *Pythium* and *Rhizoctonia*, 405; to *Sclerospora graminicola*, 625; to *Sclerotinia fructigena*, 703, 782; to *Spongospora subterranea*, 240; to *Sporotrichum gougeroti* and *S. schenckii*, 569; to *Thielaviopsis basicola*, 493, 513; to *Trichophyton gypseum*, 568; to yellowing of beans in U.S.A., 496; to yellowing of sugar-cane in India, 536.
[Hydrogen] sulphide, see Sulphuretted hydrogen.
Hymenochaete rubiginosa on oak in France, 795.
Hymenomycete on vine in Spain, 354.
Hyoscyamus niger as a differential host for potato mosaics and necrotic viruses, 139.
— —, Hy. II, Hy. III, and Hy. IV virus diseases of, in England, 243; protective inoculation against (virus IV), 582; transmission of, by needle, and of Hy. II and Hy. III by *Myzus persicae*, 243; to various hosts, 243.
— — mosaic, 248; 'healthy potato virus' in relation to, 318.
— —, tobacco mosaic can infect, 120.
Hypocrella reineckiana on *Pulvinaria* in Sierra Leone, 553.
Hypoderma brachysporum synonym of *H. desmazierii*, 667.
— *deformans* renamed *Elytroderma deformans*, 254.
— *desmazierii* can infect pine, 255; occurrence in Germany, 604, 667; study on, 604; synonymy of, 254, 667.
— *lineare* synonym of *Bifusella linearis*, 667.
— *namyslowski* synonym of *H. desmazierii*, 254.
— *pini*, *H. robustum* var. *pini* renamed, 254.
— *strobicola* synonym of *H. desmazierii*, 667.
Hypodermella on conifers, buffer content of sap in relation to, 814.
— *concolor*, *H. montivaga* f. *concolor* renamed, 254.
— — on pine in Canada and U.S.A., 255.

[*Hypodermella*] *lacrimiformis* on pine in U.S.A., 255.
— *laricis* can infect larch, 255.
— *limitata* on pine in U.S.A., 255.
— *montivaga* f. *concolor* renamed *H. concolor*, 254.
— *nervata* on *Abies balsamea* in Canada, 255.
— *sulcigena* on pine in U.S.A., 255.
Hypoxylon, formation of black lines in wood by, 544.
Hysterographium fraxini var. *oleastri* on olive in Turkey, 707.
— *oleae* on olive in Turkey, 706.
Hystrix patula, *Puccinia graminis* on, in U.S.A., 556.

Iberis pinnata and *I. umbellata*, *Plasmodiophora brassicae* on, in Russia, 346.
Ibis, use of, against wheat bunt in the Argentine, 683.
Ilex vomitoria, *Tryblidiella hysterina* on, in U.S.A., 791; *Diplodia* stage of, 791.
Illosporium mattirolianum renamed *Sphaceloma mattirolianum*, 661.
Immunization of plants against *Acrostalagmus cephalosporioides*, *Aspergillus niger*, *Botrytis cinerea*, and *Macrosporium commune*, 779.
Impatiens balsamina, *Bacterium solanacearum* can infect, 488.
— —, — *tumefaciens* on, biochemistry of, 148.
Improved semesan bel, use of, against *Ceratostomella fimbriata* and *Monilochaetes infuscans* on sweet potato, 612.
Indigofera arrecta, *Rosellinia bunodes* on, in Java, 425.
Infectious chlorosis, see Chlorosis, infectious.
— variegation, see Variegation, infectious.
Inga, *Nectria anisophila* on, in Costa Rica, 438.
Internal breakdown of apple in New Zealand, 35, 573.
— — of pear in U.S.A., 102.
— cork of apple in Tasmania, 36.
— decline of lemon in Italy, 214, 746.
— rust spot of potato, see Spraing of.
Iodine method for detecting mosaic virus in tobacco, 118.
—, toxicity of, to ringworm fungi, 509.
—, use of, against *Armillaria mellea* on pine, 799; against *Ustilago avenae* on oats, 12.
Ipomoea batatas, see Sweet potato.
Ips in relation to *Ceratostomella ips* on pine in Japan, 606.
— *typographus* in relation to *Ceratostomella penicillata* on spruce in Switzerland, 409.
Iris, *Botrytis convoluta* on, in Canada, (?) England, (?) France, (?) Germany, (?) Holland, and U.S.A., 293.
—, *Fusarium* (?) *oxysporum* on, in U.S.A., 374.
—, *Septoria iridis-japonicae* on, in Italy, 293.
Iron salts, use of, against pecan rosette, 339.
— sulphate, use of, against *Ceratostomella ulmi* on elm, 334; against pecan rosette, 602; against vine rougeau, 487. (See also Ferric and Ferrous sulphate.)
— — -lime sulphur, use of, against *Venturia inaequalis* on apple, 613.
— sulphide excess lime-sulphur, use of, against *Venturia inaequalis* on apple, 28.
Irpex destruens, use of, in tests of wound dressings for tea, 597.
Isaria farinosa, *Melanospora parasitica* and *Sporotrichum isariae* on, in Great Britain, 216.
— *graminiperda* on *Poa bulbosa* in S. Australia, 141.
Isariopsis griseola on bean in Réunion, 680; in U.S.A., 2.
Ischnaspis filiformis, *Pseudomicrocera henningsii* on, in the Seychelles, 144.
Ivy (*Hedera helix*), (?) *Bacterium herbicola aureum* on, in U.S.A., 98.
—, *Phoma destructiva* can infect, 24.
—, *Phytomonas hederae* on, in U.S.A., 98.

Jaraia salicis on *Salix amygdalina*, *S. fragilis*, *S. purpurea*, and *S. viminalis* in Czecho-Slovakia, 62.
Jasmine (*Jasminum*), *Phyllactinia corylea* on, in India, 395.
Jatropha podagrica, *Botrytis* on, in Sierra Leone, 553.
Jonathan spot of apple in New Zealand, 574.
Juglans, see Walnut.
— *cinerea*, see Butternut.
Juniper (*Juniperus*), (?) *Phomopsis juniperovora* on, in U.S.A., 251.
Juniperus chinensis, *Gymnosporangium koreaense* and *G. yamadae* on, in China, 396.
— *procera*, *Armillaria mellea* on, in S. Africa, 142.
— *sabina*, *Bacterium tumefaciens* on, in U.S.A., 406.
— *virginiana*, *Gymnosporangium germinale*, *G. globosum*, and *G. juniperi-virginianae* on, in U.S.A., 704.
Jute (*Corchorus*), *Macrophomina phaseoli* can infect, 267.

Kabatiella caulivora on clover in U.S.A., 11, 78.
Kalimat, use of, against wheat bunt, 683.
'Kalimati' disease of sugar-cane in Java, 425.
Kaolin, effect of, on assimilation in wheat leaves, 383.
—, use of, with fungicides, 122.
Kapok, see *Eriodendron anfractuosum*.
'Karsan', use of, against *Phytophthora infestans* on potato, 718.
Kayso as a wetting agent, 182.
Kentia, *Fusarium* on, in U.S.A., 79.
'Kerol', use of, against *Phytophthora* on *Piper betle*, 420; against *Pythium de*

Baryanum on cauliflower, 709; against *Rhizoctonia* and *Sclerotium rolfsii* on *Piper betle*, 420.
Kochia scoparia var. *trichophylla*, curly top of beet affecting, in U.S.A., 446.
Koefoed-Johnsen's soil sterilizer, 709.
Koelreuteria paniculata, *Verticillium* on, in Italy, 338.
Koji, *Aspergillus awamori* in, 397.
Kolodust, sulphur content of, 708.
—, use of, against *Diplocarpon rosae* on rose, 696; against *Erysiphe polygoni* on bean, 673; against *Puccinia graminis* and *P. lolii* on oats, 504.
Kolofog, sulphur content of, 708.
—, use of, against *Erysiphe polygoni* on bean, 673.
Koloform, sulphur content of, 708.
Kolotex, use of, against *Diaporthe umbrina* and *Diplocarpon rosae* on rose, 25, 696.
Kontimix seed disinfection apparatus (short process), 501.
Korab disease of tobacco in Sumatra, 471.
'Kroepoek', see Leaf curl of tobacco and *Zinnia elegans*.
Kuehneola rosae on rose in Japan, 447.

Lactarius chrysorheus on pine forming mycorrhiza, 778.
— *deliciosus* on pine forming mycorrhiza, 386, 778.
Lactuca sativa, see Lettuce.
Laelia anceps, *Rhizoctonia repens* in mycorrhiza of, 649.
Lagena radicicola on *Agropyron repens*, barley, grasses, maize, rye, and wheat in Canada, 749.
Lagenaria leucantha, beet curly top virus can infect, 447.
Lantana camara in relation to spike disease of sandal in India, 129.
Larch (*Larix*), *Blastophoma thuemeniana* on, 790; *Sphaeropsis pilya* renamed, 790.
—, *Corethrostroma laricis* on, 790.
—, *Cortinarius mucosus* in mycorrhiza of, in Great Britain, 183.
—, *Dasyscypha calycina* on, in England, 342; in U.S.A., 733.
—, *Elaphomyces* in mycorrhiza of, in Scotland, 529.
—, *Hypodermella laricis* can infect, 255.
—, *Meria laricis* on, in England, 342.
—, permanent defoliation of, in England, 341.
'Latent virus' of potato, see Potato, 'healthy potato virus' of.
Lathyrus davidii, *Uromyces orobi* on, in Japan, 596.
— *maritimus*, *Uromyces fabae* f. sp. *lathyri maritimi* on, in Japan, 596.
— *odoratus*, see Sweet pea.
— *palustris* var. *lineaefolius*, *Uromyces fabae* on, in Japan, 596.
Laurus nobilis, *Exobasidium lauri* on, note on, 664.
Laux, toxicity of, to *Penicillium expansum*, 226.
LE-3, composition, and use of, against *Ceratostomella* on timber, 668.
Lead, estimation of, in plant protectives, 708.
— arsenate injury, 29, 30.
— —, use of, against the vector of *Ceratostomella ulmi* on elm, 795; with fungicides, 11, 28, 29, 30, 31, 225, 297, 298, 572, 766.
Leaf bronze of rose in America and England, 447.
— crinkle of coffee in the Belgian Congo, 691.
— curl of *Pelargonium zonale* in Belgium and Germany, 514.
— — of sesame in Tanganyika, 552, 748; in Uganda, 748.
— — of tobacco, anatomy of, 474; breeding against, 748; crinkle and curl synonyms of, 58; legislation against, in S. Rhodesia, 736; occurrence (?) in the Belgian Congo, 143; in E. Africa, 791; in Java, 474; in Rhodesia, 58, 791; in Rumania, 791; in S. Africa, 143; in Tanganyika, 143; in the Transvaal, 791; in Zanzibar, 143; studies on, 58, 574; survival of, on volunteer plants, 58; transmission of, by Aleyrodidae, 58, 791; by *Bemisia*, 143, 475; types of, 474.
— — of *Zinnia elegans*, anatomy of, 474.
— disease of oil palm in Sierra Leone, 553.
— fall of cassava in Sierra Leone, 553.
— roll of potato, effect of, on carbohydrate metabolism, 48; on growth, 237; on nitrogen metabolism, 388; on physiology of host, 238; on yield, 49, 237; factors affecting, 236; identity of European and American forms of, 48; notes on, 585; occurrence in Belgium, 585; in Denmark, 715; in Europe, 48, 587; in France, 491; in Germany, 238, 587; in Poland, 716; in Scotland, 48, 388; in U.S.A., 48, 188, 237, 612; physiological theories of, not accepted, 587; recent work on, 187; studies on, 48, 237, 238, 388; transmission of, 612; by grafts, 587; by *Myzus persicae*, 48, 587; varietal resistance to, 715, 716.
— — of vine in Italy, 418; relation of, to mosaic, 419. (See also Court-noué of.)
— scald, false, of sugar-cane, see Fourth disease of.
— scorch of currants, control, 302, 773; etiology of, 773; occurrence in Austria, 302; in Germany, 773; in Holland, 705.
— — of gooseberry in Austria, 302; in Germany, 773.
— — of plum in U.S.A., 615.
— speckle of banana in Queensland, 457.
— spotting of pineapple in Hawaii, 521; *Pseudococcus brevipes* in relation to, 521.
— spots of sunflower in England, 571.
— stipple of sugar-cane in Porto Rico, 788.

Lecanium corni in relation to plum pox in Bulgaria, 230.
Ledum, Elsinoe ledi on, in Newfoundland and U.S.A., 661; *Aulographium ledi* renamed, 661; *Sphaceloma* imperfect stage of, 661.
— *groenlandicum, Chrysomyxa ledi* and *C. ledicola* on, in U.S.A., 67.
Leeks (*Allium porrum*), *Mycosphaerella schoenoprasi* on, from Japan, 335.
—, *Phoma terrestris* on, in U.S.A., 547.
Legislation against *Actinomyces scabies* on potato in Portugal, 127.
— — *Bacillus amylovorus* on fruit trees and other plants in Bulgaria, 592; in Portugal, 672; in S. Rhodesia, 463.
— — *Ceratostomella ulmi* on elm in Germany, 591; in Holland, 737; in S. Rhodesia, 399.
— — conifer diseases in Italy, 528.
— — *Corticium salmonicolor* on citrus in Italy, 565.
— — court-noué of vine in Portugal, 672.
— — *Cronartium ribicola* on pine in U.S.A., 381, 400.
— — *Deuterophoma tracheiphila* on lemon in Sicily, 256.
— — *Dibotryon morbosum* on cherry and plum in Bulgaria, 592.
— — *Diplodia zeae* on maize in Bulgaria, 592.
— — *Dothichiza populea* on poplar in Germany, 800.
— — *Endothia parasitica* on chestnut in Bulgaria, 592; in Portugal, 672; in S. Rhodesia, 399.
— — *Entyloma oryzae* on rice in U.S.A., 464.
— — *Exobasidium vaccinii* on *Rhododendron indicum* in Germany, 398.
— — — *vexans* on tea in S. Rhodesia, 463.
— — *Fusarium oxysporum cubense* on banana in Mexico and other countries, 303.
— — *Gloeosporium limetticolum* on citrus in Italy, 565.
— — *Marasmius perniciosus* on cacao in the Dominican Republic, 336; in Trinidad, 144.
— — *Melanomma glumarum* on rice in U.S.A., 464.
— — mosaic of hops in Australia, 336.
— — *Nectria coccinea* var. *sanguinella* on poplar in Germany, 399, 800.
— — nursery stock diseases in Canada and U.S.A., 335.
— — olive diseases in Spain, 127.
— — *Oospora oryzetorum* on rice in U.S.A., 464.
— — phony disease of peach in U.S.A., 528, 576.
— — *Phytophthora cambivora* in Portugal, 672.
— — — *parasitica* on tobacco in Mauritius, 554.
— — plant diseases in Egypt, 592; in Great Britain, 798, 800; in S. Rhodesia, 399, 463; in Syria and Lebanon, 592; in Tunis, 335.
[Legislation against] potato diseases in Portugal, 127.
— — *Pseudomonas citri* on citrus in Italy, 565; in S. Rhodesia, 463.
— — *Pseudoperonospora humuli* on hops in Australia, 336; in Norway, 528.
— — *Puccinia asparagi* on asparagus in Germany, 336.
— — — *graminis* on barberry in Esthonia, 800; in Germany, 736; in Latvia, 672; in U.S.A., 400.
— — — *lolii* on *Rhamnus cathartica* in Esthonia, 800; in Latvia, 672.
— — rice diseases in U.S.A., 464, 736.
— — *Sclerospora* on maize in S. Rhodesia, 463.
— — — *macrocarpa* on rice in U.S.A., 464.
— — *Septoria azaleae* on *Rhododendron indicum* in Germany, 398.
— — *Sphaeropsis tumefaciens* on citrus in Italy, 565.
— — *Spongospora subterranea* on potato in Bulgaria, 592; in Russia, 589.
— — *Synchytrium endobioticum* on potato in Bulgaria, 592; in Great Britain, 800; in Poland, 591; in Portugal, 127, 672; in S. Rhodesia, 464; in Switzerland, 190.
— — tobacco diseases in S. Rhodesia, 736.
— regulating the sale of fungicides in Latvia, 128; in Spain, 127; of sulphur fungicides in French Morocco, 128.
— — the use of food preservatives in various countries, 695; of packing materials for imports into U.S.A., 464, 736.
Lemon (*Citrus limonum*), *Armillaria mellea* on, in Nyasaland, 10.
—, *Aspergillus niger* on, in Italy, 434.
—, *Bacillus* (?) *citrimaculans* on, in Sicily, 283.
—, *Botryosphaeria ribis* on, in Palestine, Sicily, and Tunis, 283.
—, *Colletotrichum gloeosporioides* on, in India, 369.
—, *Deuterophoma tracheiphila* on, control, 214, 565; legislation against, in Italy, 256; occurrence in Italy, 214, 256, 565; varietal resistance to, 565.
—, *Diaporthe citri* on, in U.S.A., 89.
—, die-back of, in U.S.A., 434.
—, gummosis on, in Sierra Leone, 553.
—, internal decline of, in Italy, 214, 746.
—, *Macrophomina phaseoli* on, 727.
—, mechanical injury to fruit of, in Italy, 746.
—, mottle leaf of, in U.S.A., 434.
—, *Oidium tingitaninum* on, in Ceylon, 167.
—, *Oospora citri-aurantii* on, in England and Sicily, 282.
—, *Penicillium digitatum* and *P. italicum* on, antagonism between, 168; losses caused by, 282; mixed inoculations with, 168, 282; notes on, 282; occurrence in England, 282; in Italy, 168, 282.

[Lemon], *Phomopsis californica* on, see *Diaporthe citri* on.
—, — *cytosporella* on, in Italy, 746.
—, *Phytophthora citrophthora* on, control, 368; notes on, 281, 283; occurrence in Sicily, 281; in U.S.A., 281, 368; varietal susceptibility to, 368.
—, — *parasitica* on, in U.S.A., 368.
—, *Pseudomonas citri* on, in Ceylon, 77.
—, — *citriputeale* on, in Sicily, 281.
—, *Rhynchodiplodia citri* on, in Italy, 200.
—, *Sclerotinia minor* and *S. sclerotiorum* on, in Sicily, 282.
—, *Sporotrichum citri* on, in Jamaica, 166; in Sierra Leone, 202.
Lentils (*Lens esculenta*), *Erysiphe polygoni* on, in Siberia, 307.
Lentinus lepideus on timber in England, 669; in U.S.A., 740.
— *tigrinus* on timber, 411.
Lenzites sepiaria on timber, factors affecting, 411; occurrence in U.S.A., 740.
Lepargyraea canadensis, *Puccinia lolii* on, in Canada, 364.
Leptographium penicillatum, *Ceratostomella penicillata* ascigerous stage of, 409.
— *phyconyces*, *Graphium phyconyces* synonym of, 409.
— —, *Hantzschia phycomyces* renamed, 409.
Leptomitus lacteus in water in England and Ireland, 58.
Leptoporus broomei synonym of *L. undatus*, 410.
— *undatus* in a tunnel in Czecho-Slovakia, 410; synonymy of, 410.
Leptosphaerella regarded as a subdivision of *Leptosphaeria*, 726.
(?) *Leptosphaeria* on *Agropyron tenerum* in Canada, 621.
—, proposed division of, into four genera, 726.
— *abutilonis* on *Abutilon avicennae* in Russia, 632.
— *buxina* on box in Portugal, 726.
— *coniothyrium* on dewberry in U.S.A., 145.
(?) — — on elm in U.S.A., 124.
— — on raspberry in Canada, 678; in Holland, 705.
— — on rose in U.S.A., 633.
— *herpotrichoides*, antagonism of, to *Ophiobolus graminis*, 684.
— — on barley in Germany, 150, 157.
— — on cereals in France, 157, 685.
— — on rye in Germany, 150.
— — on wheat, control, 157, 279; factors affecting, 157, 279; loss of virulence of, 684; mixed inoculations with, 684; note on, 19; occurrence in Germany, 150, 157, 279.
— *luctuosa* on maize in the Caucasus, 505.
— *musarum* on banana in Ceylon, 458.
— *orthogramma* on maize in Tanganyika, 552.
— *sacchari* on sugar-cane in Tanganyika, 552.
— *salvinii* on rice in U.S.A., 392; *Helminthosporium sigmoideum* and *Sclerotium oryzae* stages of, 392.
[*Leptosphaeria*] *scolecosporarum* on oak in Portugal, 726.
Leptothyrium nervisedum on pecan in U.S.A., 798.
— *pomi*, *Microthyriella rubi* ascigerous stage of, 788.
Lettuce (*Lactuca sativa*), bacterial rot of, in U.S.A., 270.
—, *Bacterium marginale* on, control, 353; occurrence (?) in Belgium, 677; in England, 353; (?) in W. Europe, 677.
—, *Bremia lactucae* on, in U.S.A., 417, 494.
—, *Corticium solani* on, in U.S.A., 133.
— diseases, seed disinfection against, 264.
—, *Sclerotinia minor* on, in Germany, 485.
—, — *sclerotiorum* on, control, 485; occurrence in Bermuda, 421; in Germany, 485; in Holland, 780.
— tipburn in U.S.A., 196, 611.
Leucaena glauca, *Rosellinia bunodes* on, in Java, 425.
Leucostoma persoonii, note on, 603.
Light, effect of, on *Achorion schoenleini* and *Trichophyton gypseum* (short wave length), 443; on *Puccinia glumarum*, 556.
—, see also Ultra-violet rays, X-rays.
Lightning injury of coco-nut and *Hevea* rubber in Malaya, 506.
Lignasan, composition of, 345; use of, against *Ceratostomella* on timber, 345, 668.
Ligniera synonym of *Plasmodiophora*, 468.
—, taxonomic notes on, 468.
— *radicalis*, synonym of *Sorosphaera veronicae*, 469.
— *vascularum* synonym of *Amoebosporus saccharinum* and *A. vascularum*, 467.
— *verrucosa* synonym of *Sorosphaera veronicae*, 469.
Ligustrum vulgare, see Privet.
Lilac (*Syringa vulgaris*), (?) *Pseudomonas syringae* on, in England, 26.
—, *Thielaviopsis basicola* on, in U.S.A., 355.
Lily (*Lilium*), *Botrytis* on, in U.S.A., 233.
—, (?) *Monilia sitophila* on, in U.S.A., 270.
— mosaic in U.S.A., 292; relation of, to tulip breaking, 292.
Lima bean, see *Phaseolus lunatus*.
Limacinia citri on citrus in Italy, 746.
Lime (*Citrus aurantifolia* and *C. medica*), collar rot of, in Dominica, 21.
—, *Colletotrichum gloeosporioides* on, method of infection by, 566; occurrence in India, 369.
—, *Gloeosporium limetticolum* on, breeding against, 22, 143; effect of, on yield, 689; factors affecting, 689; occurrence in Bermuda, 421; in Dominica, 22; in St. Lucia, 689; in Trinidad, 143.
—, *Macrophomina phaseoli* on, 727.
—, *Sphaerostilbe repens* on, in Dominica, 21.

[Lime], *Sporotrichum citri* on, in Sierra Leone, 202.
Lime content of Bordeaux mixture in relation to transpiration, 459.
— deficiency in relation to dry rot of beet in France, 135.
—, effect of high calcium or magnesium content of, on Bordeaux mixture, 391, 459.
— excess in relation to chlorosis of vine, 745.
—, use of, as a filler for dusts, 271, 272.
—, — —, as a fungicide against *Bacterium pruni* and *Sclerotinia americana* on peach, 145.
—, — —, as a soil disinfectant, 42.
—, — —, with sulphur against wood-staining fungi, 669.
—, hydrated, use of, for Bordeaux mixture, 301, 325, 639, 654, 787; for copper-bentonite fungicides, 709.
—, —, with iron sulphate, use of, against *Ceratostomella ulmi* on elm, 334.
— -sulphur, analysis of, 708, 709.
— —, combination of, with oil emulsion-cresylic acid sprays, 711.
— —, effect of, on sugar content of apples, 35.
— — injury, 12, 29, 30, 101, 102, 204, 297, 300, 572, 613.
— —, manufacture of, in the Argentine, 709.
— — -calcium sulphide spray, 678.
— — -iron sulphate spray, 613.
— —, dry, cost of, 28.
— —, —, use of, against apple diseases, 423; against *Erysiphe polygoni* on beans, 673; against *Venturia inaequalis* on apple, 30, 613.
— —, —, and sulphur dust, use of, against *Venturia inaequalis* on apple, 30.
— — dust, use of, against *Erysiphe polygoni* on beans, 673.
Lime tree (*Tilia*), *Ceratostomella ulmi* can infect, 665.
— —, *Coilybia velutipes* can infect, 44.
— —, *Coniosporium corticale* on, in U.S.A., 174.
— —, *Nectria* on, in U.S.A., 404.
— —, — *cinnabarina* can infect, 44.
— —, phloem necrosis (artificial) in, 43.
— —, *Polyporus squamosus* can infect, 44.
— —, *Pyrenochaeta* can infect, 44.
— —, *Verticillium albo-atrum* on, in Germany, 117.
Linaria vulgaris, mycorrhiza of, in Italy, 309.
Linseed oil as an adhesive, 286, 435.
Linum usitatissimum, see Flax.
Liquidambar styraciflua, fire injury in relation to decay of, in U.S.A., 410.
Liriodendron tulipifera, *Gloeodes pomigena* on, in U.S.A, 298.
Liriope spicata, *Sclerotium tulipae* on, in China, 725.
Liroa, differences between *Farysia* and, 726.
— *emodensis* on *Polygonum chinense* in Java, 726; *Farysia emodensis* and *Ustilago treubii* synonyms of, 726.
Little leaf of apple in U.S.A., 99, 205.
— — of apricot in U.S.A., 99.
— — of cherry in U.S.A., 205.
— — of chilli in Ceylon, 77.
— — of citrus in Palestine, 90; in U.S.A., 99.
— — of fruit trees in U.S.A., 434.
— — of orange in Palestine, 90.
— — of peach in U.S.A., 99, 205.
— — of plum in U.S.A., 99, 434.
— — of walnut, vine, and other plants in U.S.A., 99.
— —, see also Mottle leaf, Rosette.
— peach disease of peach in U.S.A., 203.
Lizonia manihotis synonym of *Cercospora cassavae*, 137.
Lobelia cardinalis, beet curly top virus can infect, 447.
— *dentata*, mycorrhiza of, in Australia, 310.
— *erinus*, beet curly top virus can infect, 447.
— *gibbosa*, mycorrhiza of, in Australia, 310.
Locusts, *Beauveria globulifera* on, in the Philippines, 216, 217.
—, *Empusa grylli* on, in Kenya, 9.
Lodging of wheat, fungus causing, in Germany, 158.
Loganberry (*Rubus loganobaccus*), fruit blight of, in Canada, 678.
—, *Hapalosphaeria deformans* on, in Canada, 772.
Lolium italicum, (?) *Calonectria graminicola* on, in England, 754.
— —, *Cladosporium* on, in England, 32.
— —, *Claviceps* on, *Epicoccum granulatum* parasitizing, in England, 32.
— *multiflorum*, *Chaetomium kunzeanum* as endophyte of, in Germany, 779.
— —, *Tilletia foetens* can infect, 156.
— *perenne*, (?) *Calonectria graminicola* on, in England, 754.
— —, *Chaetomium kunzeanum* as endophyte of, in Germany, 779.
— —, *Puccinia lolii* on, in France, 177.
— —, *Tilletia foetens* can infect, 156.
— *temulentum*, *Chaetomium kunzeanum* as endophyte of, in Germany, 779.
Longitarsus nigripennis in relation to 'pollu' disease of *Piper nigrum*, 267.
Lonicera biflora, *Verticillium* on, in Italy, 338.
Lophodermellina pinastri synonym of *Lophodermium piceae*, 254.
Lophodermium on conifers, buffer content of sap in relation to, 314.
— *australe* synonym of *L. pinastri*, 254.
— *brachysporum* synonym of *Hypoderma desmazierii*, 667.
— *gilvum* synonym of *Naemacyclus niveus*, 254.
— *laricis* synonym of *L. pinastri*, 254.
— *lineolum* synonym of *Hypoderma desmazierii*, 254.
— *piceae*, *Lophodermellina pinastri* synonym of, 254.

[*Lophodermium*] *pinastri*, *L. australe* and *L. laricis* synonyms of, 254.
— — on *Cunninghamia lanceolata* in China, 396.
— — on pine in Germany, 68, 604.
— —, *Scolecodothis pinicola* synonym of, 254.
— *rhododendri* on *Rhododendron californicum* and *R. maximum* in U.S.A., 696.
Lopholeptosphaeria proposed as sub-division of *Leptosphaeria*, 726.
Loquat (*Eriobotrya japonica*), *Ascochyta eriobotryae* on, in China, 396.
—, *Chaetophoma eriobotryae* on, in Portugal, 726.
—, *Entomosporium* and *Fusicladium dendriticum* var. *eriobotryae* on, in New S. Wales, 231.
—, *Hendersonia eriobotryae* on, in Italy, 641.
—, *Monochaetia mali* on, in China, 396.
—, *Phoma eriobotryae* on, in Italy, 641.
—, *Physalospora cydoniae* on, in China, 396.
—, *Verticillium cinnamomum* on, in Portugal, 726.
Lowry process of timber preservation, 670.
Lucerne (*Medicago sativa*), *Aplanobacter insidiosum* on, nature of resistance to, 221; notes on, 571; occurrence in Canada, 636; in Russia, 571; in U.S.A., 177, 221, 615; study on, 221; varietal resistance to, 222, 572, 615, 636.
—, *Bacterium medicaginis* and dwarf disease of, in U.S.A., 177.
— mosaic in U.S.A., 741; can infect bean, 741.
—, *Peronospora trifoliorum* on, in U.S.A., 177.
—, *Phymatotrichum omnivorum* on, in U.S.A., 516.
—, *Plenodomus meliloti* on, in Canada, 635.
—, *Pseudopeziza medicaginis* and *Pyrenopeziza medicaginis* on, in U.S.A., 177.
—, reclamation disease of, in Denmark, 656.
—, *Uromyces medicaginis* and *Urophlyctis alfalfae* on, in U.S.A., 177.
—, white stippling of, in Germany, 765.
Luffa aegyptiaca, *Sclerotium rolfsii* on, in Sierra Leone, 203.
— *cylindrica*, beet curly top virus can infect, 447.
Lunularia cruciata, mycorrhiza of, in Italy, 235.
Lupin (*Lupinus*), *Corticium* (?) *solani* and *Pythium de Baryanum* on, in U.S.A., 96.
—, tomato spotted wilt virus can infect, 59.
—, *Verticillium dahliae* on, in England, 488.
Lycium ferocissimum, tobacco mosaic can infect, 119.
Lycopersicum esculentum, see Tomato.
— *pimpinellifolium*, tobacco mosaic can infect, 120.
Lye, use of, in the preparation of colloidal copper spray, 391.

Macrophoma dalmatica on olive in Italy, 707.
— *henriquesiana*, *Macrophomina phaseoli* (?) identical with, 763.
— *musae* on banana, 39.
— *sicula* on vine in China, 395.
Macrophomina phaseoli can infect bean, *Crotalaria juncea*, *Guizotia abyssinica*, jute, mustard, *Phaseolus mungo*, *P. mungo* var. *radiatus*, sesame, and sunflower, 267.
— —, *Macrophoma henriquesiana* (?) identical with, 763.
— — on bean in U.S.A., 2.
— — on *Cassia floribunda* and citrus in Tanganyika, 201.
— — on dahlia in U.S.A., 763.
— — on *Dolichos lablab* in Tanganyika, 201.
— — on *Eucalyptus rostrata*, 727.
— — on lemon and lime, 727.
— — on *Phaseolus lunatus* in U.S.A., 2.
— — on sweet potato in Uganda, 422.
— — on tea, notes on, 10, 538; occurrence in Nyasaland, 10, 538; in Tanganyika, 201.
— —, pycnidial stage of *Rhizoctonia bataticola* group C, 727, 763.
Macrophyllosticta ligustri on privet in Portugal, 726.
Macropsis trimaculata, transmission of peach yellows by, in U.S.A., 518.
Macrosiphum ambrosia, transmission of bean mosaic by, in U.S.A., 414.
— *gei*, transmission of bean mosaic by, in U.S.A., 414, 614; of beet mosaic by, to spinach in U.S.A., 674; of cucumber mosaic by, to spinach in U.S.A., 673; of potato virus diseases by, in U.S.A., 612; of tobacco vein-banding virus from potato by, 588; of tulip breaking by, in England, 633.
— *pisi*, transmission of bean mosaic by, in U.S.A., 414, 614; of mosaic of peas and sweet peas to bean by, in U.S.A., 414.
Macrosporium on passion fruit in New S. Wales, 576; in Queensland, 41.
— *carotae* on carrot in U.S.A., 356, 496.
— *commune*, artificial immunization of plants against, 779.
— *oleae* on olives in Italy, 745; *Pleospora herbarum* ascigerous stage of, 745.
— *parasiticum*, see *Pleospora herbarum*.
Magnesium: calcium ratio in relation to tobacco brown root rot in U.S.A., 477.
— deficiency in relation to dry rot of beet in France, 135; to sand drown of tobacco in U.S.A., 146.
— — disease of oats in Czecho-Slovakia, 165.
— — — of potatoes in U.S.A., 654.
Mahonia, see Barberry.
Maize (*Zea mays*), *Aplanobacter stewarti* on, breeding against, 206; control, 563, 688; effect of, on susceptibility to

Diplodia zeae, 364; factors affecting, 688; notes on, 78, 281, 364, 687; occurrence in Canada, 551; in Russia, 165; in U.S.A., 78, 206, 281, 364, 562, 679, 687, 688; overwintering of, 688; strains of, 364; studies on, 364, 562, 688; transmission of, by *Chaetocnema denticulata* and *C. pulicaria*, 688; by *Diabrotica longicornis*, 364; by seed, 688; varietal resistance to, 78, 364, 563, 687, 688.
[Maize], *Aposphaeria zeae* and *Ascochyta zeina* on, in the Caucasus, 505.
—, *Aspergillus fumigatus* on ensilage from, in Canada, 372.
—, *Bacillus zeae* on, in Russia, 165.
—, bacteria on, in U.S.A., 364.
—, bacteriosis of, in the Caucasus, 505.
—, *Bacterium dissolvens* on, serological tests with, 426.
—, — *holci* on, in Russia, 165.
—, *Cephalosporium acremonium* on, in the Caucasus, 505.
—, chlorosis, striped, of, in Italy, 746.
—, *Clasterosporium lindavianum* on, in Tanganyika, 552.
—, *Colletotrichum zeae* on, in the Caucasus, 505.
—, *Corticium solani* on, in Sierra Leone, 203.
—, *Diplodia frumenti* on, see *Physalospora zeicola*.
—, — *macrospora* on, in Tanganyika, 201, 552.
—, — *tubericola* on, in U.S.A., 366.
—, — *zeae* on, control, 12, 644; effect of *Aplanobacter stewarti* on infection by, 364; of X-rays on, 644; legislation against, in Bulgaria, 592; losses caused by, 12; notes on, 268, 775; occurrence in Rhodesia, 775; in Tanganyika, 201, 552; in U.S.A., 12, 268, 364, 563, 644.
—, *Fusarium* on, breeding against, 13; occurrence in the Caucasus, 505; in Kenya, 9, 13; study on, 505.
—, — *moniliforme* var. *conglutinans* on, in Kenya, 9.
—, *Gibberella fujikuroi* can infect, 719; stimulatory effect of, 590.
—, — *moniliformis* on, control, 12; dissemination of, 505; effect of, on germination, 505, 564; on yield, 564; factors affecting, 564; losses caused by, 12; occurrence in the Caucasus, 505; in Tanganyika, 201, 552; in U.S.A., 12, 564, 679; study on, 564.
—, — *saubinetii* on, control, 644, 683; dissemination of, 505; effect of, on germination, 505; factors affecting, 775; nature of resistance to, 432; note on, 313; occurrence in the Argentine, 683; in the Caucasus, 505; in Rhodesia, 775; in Tanganyika, 201, 552; in U.S.A., 432, 644.
—, *Helminthosporium maydis* on, in the Caucasus, 505.
—, — *turcicum* on, in the Caucasus, 505; in Kenya, 13.
—, *Lagena radicicola* on, in Canada, 749.
[Maize], *Leptosphaeria luctuosa* on, in the Caucasus, 505.
—, — *orthogramma* on, in Tanganyika, 552.
—, *Melanconium saccharinum* on, see *Papularia vinosa* on.
—, *Mycosphaerella maydis* and *M. zeae* on, in the Caucasus, 505.
—, *Nigrospora* on, in U.S.A., 268.
—, — *oryzae* on, in the Caucasus, 505; in Rumania, 20.
—, — *sphaerica* on, in Tanganyika, 201.
—, *Oospora verticillioides* on, in the Caucasus, 505.
—, *Papularia vinosa* on, in Tanganyika, 552.
—, *Penicillium* on, in U.S.A., 12.
—, *Phaeocytostroma ambigua* on, in Tanganyika, 552.
—, *Phyllosticta zeina* on, in the Caucasus, 505.
—, *Physalospora rhodina* on, in U.S.A., 366.
—, — *zeicola* on, in Tanganyika, 552; in U.S.A., 366; *Diplodia frumenti* imperfect stage of, 366.
—, physiological disease of, in the Caucasus, 505.
—, *Physoderma zeae-maydis* on, in U.S.A., 431, 495.
—, *Puccinia maydis* on, in Réunion, 680.
—, *Pythium epigynum* can infect, 331.
—, *Sclerospora* on, legislation against, in S. Rhodesia, 463.
—, — *indica* on, in the Caucasus, 505.
—, *Sclerotium rolfsii* on, in Sierra Leone, 203.
—, *Septoria maydis* on, in the Caucasus, 505.
—, *Sorosporium reilianum* on, control, 563, 617; note on, 552; occurrence in Russia, 165, 617; in Tanganyika, 552; in U.S.A., 563; study on, 563.
— streak in Réunion, 328; study on, 686; transmission of, by *Aphis maydis*, 328; by *Cicadulina mbila*, 686; by *C. zeae*, 687, 748.
—, stripe disease of, in Cuba, 756; (?) in Tanganyika, 143; in Trinidad, 756; transmission of, by *Peregrinus maidis*, (?) 143, 756.
—, *Ustilago zeae* on, chemical composition of spores of, 584; factors affecting, 17; gall formation by, 563; genetics of, 17; of resistance to, 365; heterothallism in, 88; hybridization in, 88; nature of resistance to, 366; occurrence in Czecho-Slovakia, 563; in Germany, 88; in Russia, 165, 617; in U.S.A., 365; studies on, 88, 365.
—, virus disease of, in Siberia, 307.
(?) 'Mal secco' of citrus in Cyprus, 747.
Malassezia furfur on man, 569; in France, 511.
Malvaviscus conzattii, nature of resistance to *Phymatotrichum omnivorum* of, 691.
Man, *Achorion quinckeanum* on, in Australia, 444; in Denmark, 95.
—, — *schoenleini* on, diagnosis of, by fluorescence of hairs, 23, 218; effect

of grenz rays on, 694; of short wave irradiation on, 443; notes on, 173; occurrence in Algeria, 510; in Germany, 444; in U.S.A., 694; vaccination against, 694.
[Man], *Acremonium* on, in Hungary, 289; in U.S.A., 290.
—, — *keio* on, in Japan, 219.
—, *Aspergillus* on, in S. America, 173; in relation to splenomegaly, 445.
—, — *flavus-oryzae* on, in Uruguay, 631.
—, — *fumigatus* on, in Holland, 289.
—, — *montevidensis* on, in Uruguay, 631.
—, — *niger* on, in the Sudan, 371; in Uruguay, 631.
—, *Blastomyces* on, see *Blastomycoides* on.
—, *Blastomycoides* on, 691; in U.S.A., 628.
—, — *dermatitidis* on, see *Endomyces dermatitidis* on.
—, — *tulanensis* on, in N. America, 171; renamed *Monosporium tulanense*, 171.
—, *Candida* on, in the Channel Islands, 692; pathogenicity of, 691, 692.
—, — (?) *albicans* on, in U.S.A., 172.
—, — *vulgaris* on, 692.
—, *Cephalosporium* on, in Germany, 444; in U.S.A., 290.
—, — *griseum* on, in France, 511.
—, — *pseudofermentum* on, in the W. Indies, 174.
—, — *spinosum* on, in the Argentine, 695.
—, *Cladosporium metaniger* on, 219; *Cryptococcus metaniger* renamed, 219.
—, *Coccidioides immitis* on, formation of endospores by, 440; occurrence in N. America, 171; in U.S.A., 170, 288; *Pseudococcidioides mazzai* synonym of, 440; renamed *Geotrichum immite*, 171; studies on, 170, 171, 440; systematic position of, 170, 171; transference of, to *Blastomycoides* not accepted, 170.
—, *Coniosporium corticale* on, in U.S.A., 174.
—, *Cryptococcus* on, in U.S.A., 370, 630.
—, — *montpellieri* on, in Algeria, 288.
—, — *psychrofilicus* on, in the Argentine, 629.
—, dermatomycoses of, history of research on, 569; increase of, in Europe, 173; occurrence in Algeria, 510; in Canada, 23; in Germany, 444; in Portugal, 442; in U.S.A., 508, 569, 630.
—, *Enantiothamnus braulti* on, in N. Africa, 288.
—, *Endomyces* on, in U.S.A., 370.
—, — *albicans* on, in France, 288.
—, — *capsulatus* var. *isabellina* on, in U.S.A., 441.
—, — *dermatitidis* on, *Blastomyces dermatitidis* renamed, 441; occurrence in the Argentine, 629; in U.S.A., 23, 441; studies on, 23, 441.
—, *Epidermophyton* on, in Canada, 23.
—, — *floccosum* on, control, 509; factors affecting, 629; occurrence in Denmark, 95; in Japan, 94; in U.S.A., 509, 630; toxicity of pine oil to, 291; vaccination against, 694.
[Man, *Epidermophyton*] *inguinale* on, see *E. floccosum* on.
—, — *interdigitale* on, in Denmark, 95; in Germany, 95, 444; in U.S.A., 630; trichophytin test for, 630.
—, *Geotrichum immite* on, see *Coccidioides immitis* on.
—, *Hemispora stellata* on, in Germany, 444.
—, *Hormodendrum rossicum* on, in Russia, 289.
—, *Malassezia furfur* on, 569; in France, 511.
—, *Microsporon* on, in the Argentine, 630.
—, — *audouini* on, diagnosis of, by fluorescence of hairs, 23, 218; by trichophytin test, 630; effect of grenz rays on, 694; occurrence in Canada, 23, 693; in Germany, 444; in U.S.A., 694; sporulation of, 693.
—, — *felineum* on, diagnosis of, by fluorescence of hairs, 218; *M. lanosum* (?) synonym of, 23; occurrence in Canada, 23. (See also *M. lanosum* on.)
—, — *fulvum* on, toxicity of pine oil to, 291.
—, — *japonicum* on, in Japan, 290.
—, — *lanosum* on, diagnosis of, by Wood's light, 23; by trichophytin test, 630; effect of grenz rays on, 694; occurrence in U.S.A., 694. (See also *M. felineum* on.)
—, *Monilia* on, 630; in U.S.A., 370, 569, 630. (See also *Candida* on.)
—, — *aegyptiaca* on, in Egypt, 218.
—, — *argentina* on, in the Argentine, 629.
—, — *castellanii* on, in N. Africa, 288.
—, — *inexorabilis* on, in the Argentine, 289.
—, — *pulmonalis* on, in the Argentine, 441.
—, *Mycoderma brocianum* on, in N. Africa, 288.
—, mycoses of, American treatise on, 217; culture medium for fungi causing, 217.
—, *Oidium rotundatum* on, in U.S.A., 630.
—, *Penicillium* on, in England, 511; in S. America, 173.
—, — *crustaceum* on, in France, 631.
—, — *glaucum* on, in the Sudan, 371.
—, *Phialophora verrucosa* on, in U.S.A., 370; *Alternaria* believed to be a stage of, 370.
—, *Pityrosporum ovale* on, in India, 442; synonymy of, 442.
—, *Puccinia graminis* spores causing asthma in, in Canada, 174.
—, *Sabouraudites ruber* and *S. r.* var. III on man in Japan, 94. (See also *Trichophyton rubrum* on.)
—, — — var. *yamaguchiense* on, in Japan, 443.
—, *Saccharomyces* on, in U.S.A., 370.
—, splenomegaly of, *Aspergillus fumigatus*, *A. hortai*, *A. nantae*, and *A. tunetana* in relation to, 445.
—, *Sporotrichum mansoni* on, in Porto

Rico, 246 ; *Cladosporium mansoni* synonym of, 246.
[Man, *Sporotrichum*] *schenckii* on, toxicity of pine oils to, 291.
—, *Torula* on, in U.S.A., 94, 629.
—, — *sacchari* on, 218 ; *Oospora d'agatae* synonym of, 218.
—, *Trichophyton* on, in Canada, 23.
—, — *acuminatum* on, in Algeria, 510.
—, — *album* on, in Canada, 219.
—, — *ceylonense* on, in Persia, 630.
—, — *crateriforme* on, in U.S.A., 694 ; *T. fumatum* formerly identified with, 510.
—, — *fumatum* on, in Algeria, 510 ; formerly identified with *T. crateriforme*, 510.
—, — *glabrum* on, in Algeria, 510 ; in Japan, 94.
—, — *gourvili* on, in French W. Africa, 511.
—, — *granulosum* on, in U.S.A., 291 ; toxicity of pine oils to, 291.
—, — *gypseum* on, effect of irradiation on, 443 ; effect of, on reaction of medium, 568 ; occurrence in Canada, 693 ; in U.S.A., 630 ; sporulation of, 693.
—, — *interdigitale* on, see *T. mentagrophytes*.
—, — *megnini* on, in S. America, 173 ; *T. rosaceum* synonym of, 173.
—, — *mentagrophytes* on, control, 509 ; factors affecting, 509, 629 ; occurrence in Japan, 94 ; in U.S.A., 291, 508, 509, 629 ; reference of, to *Ctenomyces mentagrophytes* not accepted, 694 ; synonymy of, 695 ; toxicity of alcohol to, 509 ; of pine oils to, 291 ; of sodium hypochlorite to, 629 ; transmission of, to animals, 694.
—, — *purpureum* on, in U.S.A., 509 ; toxicity of pine oils to, 291.
—, — *rosaceum* on, in U.S.A., 509, 629.
—, — *rubidum* on, in the Cameroons, 569.
—, — *rubrum* on, in U.S.A., 509, 630. (See also *Sabouraudites ruber* on.)
—, — *violaceum* on, effect of grenz rays on, 694 ; occurrence in Algeria, 510 ; in Portugal, 442 ; in U.S.A., 694 ; toxicity of dyes to, 371 ; trichophytin test for, 630.
—, *Trichosporum beigeli* on, in Central Africa, Europe, Japan, and Nigeria, 172.
—, — *giganteum* on, (?) in Costa Rica, 444.
—, — *hortai* on, in Colombia, 444 ; identity of strains of, from Brazil, Colombia, and Paraguay, 445.
Mandarin orange, see Orange.
Manganar dust, composition of, 25.
— —, use of, against *Diaporthe umbrina* and *Diplocarpon rosae*, 25, 696.
Manganese arsenate as a constituent of manganar dust, 25.
— sulphate, use of, against grey speck of oats and other crops in Sweden, 20 ; against yellowing of beans in U.S.A., 496.
Mango (*Mangifera indica*), (?) *Bacillus mangiferae* on, in Egypt, 749.
—, *Cephaleuros parasiticus* and *Corticium salmonicolor* on, in Ceylon, 77.
—, *Diplodia tubericola* can infect, 366.
—, dwarfing of, in Egypt, 749.
—, *Glomerella cingulata* on, in the Philippines, 521.
—, *Pestalozzia mangiferae* on, in Ceylon, 77.
—, *Physalospora rhodina* and *P. zeicola* can infect, 366.
—, *Rhizoctonia lamellifera* on, in Rhodesia, 727.
Manihot dulcis, *M. palmata*, and *M. utilissima*, see Cassava.
Maple, see *Acer*.
Marasmioid thread blight of cacao in the Belgian Congo, 80.
— — — of nutmeg in Java, 425.
(?) *Marasmius* on *Aleurites fordii* in Queensland, 201.
— on cacao, 207.
— *byssicola* on cacao, 207.
— *palmivorus* on coco-nut in Malaya, 507.
— — on oil palm in Malaya, 355.
— *perniciosus* on cacao, control, 143, 522 ; factors affecting, 144 ; legislation against, in the Dominican Republic, 336 ; in Trinidad, 144 ; note on, 435 ; occurrence in S. America, 207 ; in Surinam, 435 ; in Trinidad, 143, 522 ; study on, 143 ; viability of, 143.
— *sacchari* on sugar-cane in Porto Rico, 115.
— *scandens* on cacao, 207.
Marrow, see Vegetable marrow.
Marssonina rosae, see *Diplocarpon rosae*.
Martynia louisiana, tobacco mosaic can infect, 120.
Massaria theicola on tea in Indo-China, 147.
Matthiola, *Fusarium* on, in Greece, 470.
— *incana* and its var. *annua*, curly top of, in U.S.A., 446.
Mauginiella scaettae on date palm in Tunis, 303.
Measles of apple, fungus causing, said to belong to the Sphaeropsidales, 749 ; losses caused by, 12 ; notes on, 378, 749 ; occurrence in U.S.A., 12, 378, 423, 749 ; types of, 378, 423 ; varietal susceptibility to, 12, 749.
Medicago sativa, see Lucerne.
Medlar (*Mespilus germanica*), *Fabraea maculata* and *Phyllactinia corylea* on, in Italy, 181.
Melampsora abieti-caprearum on *Abies spectinata* in Poland, 550.
— *apocyni* on *Apocynum venetum* in Central Asia and Russia, 515.
— *lini* on flax, heterothallism in, 362, 632 ; occurrence in Holland, 372 ; in U.S.A., 362, 632 ; varietal susceptibility to, 372.
Melampsoraceae, list of Japanese, 596.
Melampsorella cerastii on *Abies sibirica* in Russia, 666.

Melampsoropsis abietina, see *Chrysomyxa ledi*.
— *cassandrae*, see *Chrysomyxa cassandrae*.
— *ledicola*, see *Chrysomyxa ledicola*.
— *piperiana* on *Rhododendron californicum* in U.S.A., 696.
Melanconium fructicolum on pomegranate in Ceylon, 77.
— *sacchari*, see *Pleocyta sacchari*.
— *saccharinum*, see *Papularia vinosa*.
Melanin formation in potato, 531.
Melanomma glumarum on rice, legislation against, in U.S.A., 464.
Melanospora parasitica on *Cordyceps militaris* and *Isaria farinosa* in Great Britain, 216.
Melia, *Tryblidiella* (?) *rufula* on, in U.S.A., 791 ; *Diplodia* stage of, 791.
— *azedarach*, *Phoma* on, in Java, 426.
Melilotus alba, bean mosaic can infect, 614.
— —, mosaic of, in U.S.A., 414, 741 ; transmission of, to bean, 414, 741 ; to peas and sweet peas, 741.
— —, *Penicillium brevicaule* on, in relation to 'sweet clover disease' of cattle in Canada, 699.
— —, *Plenodomus meliloti* on, in Canada, 635.
— — var. *annua*, *Cercospora zebrina* can infect, 269.
— *officinalis*, mosaic of, in U.S.A., 414, 741 ; transmission of, to bean, 414, 741.
(?) *Meliola camelliae* on *Thea oleosa* in China, 396.
Melitomma insulare in relation to *Ganoderma lucidum* on coco-nut in the Seychelles, 144.
Melon (*Cucumis melo*), *Alternaria brassicae* on, in Italy, 200.
—, *Fusarium* of, in Spain, 354.
—, — *niveum* on, tyloses induced by, 418 ; occurrence in U.S.A., 269, 418, (?) 744 ; study on, 744 ; varietal resistance to, 269.
— mosaic in Egypt, 749.
—, *Pseudoperonospora cubensis* can infect, 5 ; occurrence in U.S.A., 358.
Membranosorus synonym of *Plasmodiophora*, 468.
Mercuric chloride as a constituent of roggenfusariol, sublimoform, and weizenfusariol, 305.
— —, effect of, on assimilation of wheat leaves, 383.
— —, estimation of, in treated timber, 133.
— —, toxicity of, to *Corticium solani*, 214, 530 ; to fungi on man, 304 ; to moulds on wool, 25 ; to *Mucor* spp., 693 ; to *Sclerospora graminicola*, 625.
— —, use of, against *Actinomyces scabies* on potato, 389, 462, 652 ; against *Bacterium malvacearum* on cotton, 421 ; against *Bact. marginatum* on gladiolus, 356 ; against *Botrytis tulipae* on tulip, 96 ; against *Corticium solani* on cucumber, 710 ; on potato, 110, 389, 391, 530, 613, 651, 652 ; against diamond canker of plum, 180 ; against *Fusarium angustum* on cotton, 287 ; against *F. bulbigenum* on narcissus, 225 ; against *F. javanicum* var. *theobromae* on vegetable marrow, 197 ; against *F. orthoceras* and *F. vasinfectum* var. *inodoratum* on cotton, 287 ; against *Gibberella fujikuroi* and *Ophiobolus miyabeanus* on rice, 533 ; against *Phytophthora richardiae* on *Zantedeschia aethiopica*, 27 ; against *Piricularia oryzae* on rice, 533 ; against *Plasmodiophora brassicae* on rape, 412 ; against *Pythium butleri* on *Agrostis stolonifera*, 450 ; against *Sclerotium cepivorum* on onion, 4 ; against *S. rolfsii* on apple, 377 ; against wood-staining fungi, 669 ; as a soil disinfectant, 267.
[Mercuric chloride], acidulated, 110, 389, 412, 530, 651, 652.
— —, —, injury caused by, to potato tubers, 111.
— — with potassium nitrate, use of, against *Corticium solani* on cucumber, 710.
— iodide, use of, against (?) *Monilia sitophila* on lily, 270.
Mercurous chloride, use of, against *Corticium solani* on potato, 651.
Mercury, estimation of, in disinfected seed-grain, 152 ; in seed disinfectants, 305.
— compounds, bactericidal value of, 775.
— —, injury to tobacco caused by, 402.
— —, use of, against *Bacterium malvacearum* on cotton, 439 ; for soil disinfection, 42.
— —, organic, use of, against *Ceratostomella* on timber, 345 ; against *Diplodia zeae* and *Gibberella saubinetii* on maize, 644.
— cyanide, toxicity of, to *Mucor* spp., 693.
— dusts, use of, against *Ustilago avenae* on oats, 614.
— iodide, a constituent of abavit B, 306.
—, yellow oxide of, use of, against *Actinomyces scabies* and *Corticium solani* on potato, 652.
Meria laricis on larch in England, 342.
Merthiolate, toxicity of, to ringworm fungi, 509.
Merulius lacrymans, germination of spores of, 607.
— — on timber, control, 68, 260, 261, 262 ; factors affecting, 260, 261, 739 ; identification of mycelium of, 259 ; mixed inoculations with, 259 ; notes on, 68 ; occurrence in England, 68 ; in Russia, 258, 259, 260, 261 ; in Scotland, 739 ; production of water by, 258, 739 ; studies on, 258, 259, 739.
Mespilus, see Medlar.
Methyl alcohol, resin, and potassium hydroxide, use of, against *Pseudoperonospora cubensis* on cucumber, 493.
Miag seed disinfection apparatus formerly known as Germator, 430.

Mice, *Achorion quinckeanum* on, in Australia and U.S.A., 444.
Micrococcus ulmi on elm in Switzerland, 194.
Microdiplodia abutilonis on *Abutilon avicennae* in Russia, 632.
— *agaves* on *Agave americana* in India, 395.
— *boehmeriae* on *Boehmeria nivea* in Russia, 632.
Micromonospora chalceae in soil in Australia, 241; '*Streptothrix*' *chalceae* renamed, 242.
— *coerulea*, *M. fusca*, and *M. parva* in soil in Australia, 242.
Micropera, *Gelatinosporium abietinum* referred to, 131.
Microscissors, use of, in single cell isolation, 579.
Microsphaera alni on chestnut and oak in China, 725.
— *polonica* on hydrangea, ascigerous stage of *Oidium hortensiae*, 550; control, 175, 642; occurrence in Germany, 578, 642; in Poland, 550; in Switzerland, 175.
— *quercina* on oak, factors affecting, 542; occurrence in Germany, 578; in Italy, 542; in Réunion, 680; overwintering of, 542; study on, 542.
Microsporon on man in the Argentine, 630.
—, toxicity of dyes to, 371.
— *audouini* on man, diagnosis of, by fluorescence of hairs, 23, 218; by trichophytin test, 630; effect of grenz rays on, 694; occurrence in Canada, 23, 693; in Germany, 444; in U.S.A., 694; sporulation of, 693.
— *felineum* on man, diagnosis of, by fluorescence of hairs, 218; *M. lanosum* (?) a synonym of, 23; occurrence in Canada, 23. (See also *M. lanosum* on.)
— —, sporulation of, on detached hairs, 693.
— *fulvum* on man, toxicity of pine oils to, 291.
— *japonicum* on man in Japan, 290.
— *lanosum* on man, diagnosis of, by Wood's light, 23; by trichophytin test, 630; effect of grenz rays on, 694; occurrence in U.S.A., 694.
—, — (?) synonym of *M. felineum*, 23.
— —, thermal death point of, 629.
Microthyriella rubi on *Rubus argutus* in U.S.A., 788; ascigerous stage of *Leptothyrium pomi*, 788.
Mildew of wool in U.S.A., 24.
Milk, fungi in, in Ireland, 440.
—, *Phoma hibernica* in, in Irish Free State, 24.
—, *Torula nigra* in, in U.S.A., 513.
—, use of, as a protective agent for colloidal sulphur, 356; with cresylic acid oil emulsion and lime-sulphur sprays, 711.
'Minati' copper spray, composition, and use of, against *Plasmopara viticola* on vine, 199.
Mirabilis jalapa, curly top of beet affecting, in U.S.A., 446.
Mitchella repens, intumescences on, in U.S.A., 529.
Mitteriella zizyphina on *Zizyphus rotundifolia* in India, 395.
Molasses, use of, in the preparation of colloidal copper spray, 391.
Molybdenic acid or salts, bodies resembling intracellular bodies of tomato aucuba mosaic induced by, 526.
Momordica charantia, mosaic of, in India, 612.
Monilia in paper and pulp mill slimes in U.S.A., 545, 607.
— on hides in U.S.A., 94.
— on man, note on, 630; occurrence in U.S.A., 370, 569, 630.
— on plum, see *Sclerotinia* on.
—, parchment-like membranes made from, 607.
— *aegyptiaca* on man in Egypt, 218.
— *argentina* on man in the Argentine, 629.
— *castellanii* on man in N. Africa, 288.
— *cerebriforme* on tobacco, 662.
— *guilliermondi*, physiology of, 568.
— *inexorabilis* on man in the Argentine, 289.
— *macrospora* on tobacco, 662.
— *medoacensis* on tobacco, 662; *Oospora medoacensis* renamed, 662.
— *microspora* on tobacco, 662.
— *pseudotropicalis*, physiology of, 568.
— *pulmonalis* on man in the Argentine, 441.
(?)— *silophila* on lily in U.S.A., 270. (See also *Neurospora silophila*.)
— *variabilis* on bread in Russia, 625.
—, see also *Candida*.
Moniliopsis on *Gloxinia* in Germany, 97.
— *aderholdi* on begonia in Germany, 448.
Monilochaetes infuscans on sweet potato, control, 612; occurrence in Sierra Leone, 203; in U.S.A., 145, 612; varietal resistance to, 145.
Monochaetia-like variants of *Pestalozzia funerea*, 332.
— *mali* on loquat in China, 396.
— *uniseta* on vine in China, 395.
Monosporium tulanense, *Blastomycoides tulanensis* renamed, 171.
'Moron' disease of potato in U.S.A., 188.
Mortierella and *M. isabellina* var. in soil in Victoria, 242.
Morus, see Mulberry.
Mosaic of bean, control, 204, 413; genetics of resistance to, 614; occurrence in Egypt, 749; in Italy, 413; in S. Africa, 142; in U.S.A., 1, 71, 204, 414, 614, 615, 741; studies on, 413, 741; transmission of, by *Aphis gossypii*, *A. rumicis*, *Brevicoryne brassicae*, *Hyalopterus atriplicis*, and *Macrosiphum ambrosia*, 414; by *M. gei* and *M. pisi*, 414, 614; by *Myzus persicae*, 414; by ovule and pollen, 414; by seed, 413, 741; from and to clover, 414, 614, 741; lucerne, 741; *Melilotus alba*, 414,

614, 741 ; *M. officinalis*, peas, and sweet peas, 414, 741 ; soy-bean, 614 ; types of, 414, 614, 741 ; varietal resistance to, 71, 413, 414, 614, 615, 741.
[Mosaic] of beet, cytology of, 263 ; occurrence in Russia, 263 ; in U.S.A., 673 ; properties of virus of, 674 ; study on, 263 ; transmission of, by *Macrosiphum gei* and *Myzus persicae* to spinach, 674 ; types of, 263.
— of blackberry in U.S.A., 770.
— of cactus in Germany, 570.
— of cassava, control, 352 ; notes on, 202 ; occurrence in the Belgian Congo, 137 ; in Madagascar, 352 ; in Sierra Leone, 202, 553 ; transmission of, by *Bemisia mosaicivecta*, 137 ; by grafting, 202 ; by insects, 748 ; varietal resistance to, 553.
— of celery in U.S.A., 136 ; transmission of, by *Aphis gossypii*, from *Commelina nudiflora*, 136.
— of chilli in Egypt, 749 ; in Spain, 354.
— of clover in U.S.A., 414, 741 ; transmission of, to bean, 414, 741 ; to peas and sweet peas, 741 ; types of, 741.
— of crucifers in U.S.A., 546.
— of cucumber, properties of virus of, 108 ; transmission of, by *Macrosiphum gei* and *Myzus persicae*, 673 ; to beet and spinach in U.S.A., 673.
— — — on tobacco, effect of host on virus of, 108 ; occurrence in U.S.A., 108, 205, 539.
— of dahlia in U.S.A., 374, 697 ; relation of, to dahlia stunt, 697 ; transmission of, by grafting and *Myzus persicae*, 374, 697.
— of *Datura stramonium*, 'healthy potato virus' in relation to, 318.
— of dewberry in U.S.A., 770.
— of *Epiphyllum* in Germany, 570.
— of *Epiphyllum truncatum* (?) in Czecho-Slovakia, 294 ; in Germany, 570 ; transmission of, by *Orthezia insignis* and sap, 294.
— of fig in U.S.A., 382.
— of grasses affecting sugar-cane in the Philippines, 245.
— of hops, legislation against, in Australia, 336 ; occurrence in England, 111, 242 ; (?) in U.S.A., 656 ; symptomless carriers of, 242 ; varietal resistance to, 111.
— of horse-radish in U.S.A., 351 ; transmission of, to mustard and turnip, 352.
— of *Hyoscyamus niger*, 243 ; 'healthy potato virus' in relation to, 318.
— of lily in U.S.A., 292 ; relation of, to tulip breaking, 292.
— of lucerne in U.S.A., 741 ; transmission of, to bean, 741.
— of *Melilotus alba* in U.S.A., 414, 741 ; transmission of, to bean, 414, 741 ; to peas and sweet peas, 741.
— — — *officinalis* in U.S.A., 414, 741 ; transmission of, to bean, 414, 741.
— of melon in Egypt, 749.
[Mosaic] of *Momordica charantia* in India, 612.
— of *Nicotiana triplex*, causing sterility, in Russia, 728.
— of peach in U.S.A., 37.
— of peas in U.S.A., 414, 741 ; transmission of, to bean by *Macrosiphum pisi*, 414 ; by sap, 414, 741.
— of *Petunia violacea* in Rumania, 580.
— of *Phyllocactus gaertneri* in Germany, 570.
— of *Physalis alkekengi*, 'healthy potato virus' causing, 318.
— of potato, effect of, on catalase activity of host, 778 ; on yield, 612 ; factors affecting, 49 ; filtration of viruses X and Y of, 42 ; *Hyoscyamus niger* as a differential host for, 139 ; identity of European and American forms of interveinal, 48 ; notes on, 492 ; occurrence in Belgium, 585 ; in Denmark, 715 ; in England, 42 ; in Europe, 48 ; in Germany, 586, 587 ; in Italy, 492 ; in Poland, 716 ; in Rumania, 580 ; in Russia, 778 ; in Scotland, 139 ; in U.S.A., 48, 49, 50, 588, 612 ; properties of viruses of, 42, 731 ; recent work on, 187 ; relation of, to 'healthy potato virus', 48, 588 ; to potato crinkle, 48, 717 ; to potato para-crinkle, 48, 648 ; to potato ring spot, 588 ; to potato streak, 589, 648 ; to tobacco veinbanding, 588 ; to tomato stripe, 731 ; of virus A to, 587, 648 ; of viruses H 19, R 77 to, 587 ; of X and Y to, 42, 587, 648 ; separation of X and Y viruses of, 42 ; studies on, 588 ; transmission of, by *Myzus persicae*, 587, 648 ; to *Datura stramonium*, 587 ; to *Nicotiana glutinosa*, 731 ; to *N. longiflora* and tobacco, 586 ; to *Petunia nyctaginiflora*, 587 ; tuber indexing against, 49, 50 ; types of, 48, 49, 50, 388, 585, 586, 588, 612, 648 ; varietal resistance to, 588, 715.
— — —, latent, see Potato, 'healthy potato virus' of.
— of raspberry, control, 488, 771 ; factors affecting, 203, 770 ; migration of virus of, in tissues, 770 ; notes on, 204, 205 ; occurrence in Canada, 678 ; in England, 488, 771 ; in Holland, 705 ; in U.S.A., 203, 204, 770 ; stock certification against, in Canada, 678 ; in England, 771 ; study on, 770 ; transmission of, by *Amphorophora rubi*, *A. rubicola*, *A. sensoriata*, and (?) *Aphis rubiphila*, 771 ; types of, 203, 678, 770 ; varietal susceptibility to, 203, 488.
— of *Rhipsalis rosea* in Germany, 570.
— of *Rhododendron ponticum* in U.S.A., 696.
— of rose in N. America, 447.
— of Solanaceae in Rumania, 580.
— of *Solanum nodiflorum*, 'healthy potato virus' causing, 318.
— of strawberry in Holland, 705.
— of sugar-cane, breeding against, 113, 326, 394 ; control, 56, 114, 326, 327, 463, 722 ; effect of, on germination, 192 ; on yield, 192, 266, 327 ; factors

affecting, 56; legislation against, in Kenya, 9; losses caused by, 463, 679; method of inoculating, 660, 722; occurrence in the Argentine, 463, 594, 786; in Barbados, 788; in Egypt, 749; in Hawaii, 113, 722; in India, 192, 266, 659; in Kenya, 9; in the Philippines, 245; in Porto Rico, 113, 326, 327, 394; in Queensland, 787; in Réunion, 327; in Uganda, 422; in U.S.A., 660, 679, 786; prolonged incubation in, 327; properties of virus of, 660, 722; studies on, 245, 660; transmission of, by knives, 114; types of, 245; varietal resistance to, 113, 114, 245, 326, 327, 394, 422, 463, 679, 786, 787.
[Mosaic] of sunflower in India, 612.
— of sweet pea in U.S.A., 414, 741; transmission of, to bean by *Macrosiphum pisi*, 414; by sap, 414, 741.
of tobacco, attempted immunization against, 314, 398; control, 145, 205, 540; cytology of, 581, 728; factors affecting, 108, 540, 581, 792; histology of, 119, 538, 727; incubation period of, 119; local lesions in, 526; malformations caused by, 581; nature of virus of, 314; of resistance of certain plants to, 313; notes on, 145, 205, 539; occurrence in Germany, 313; in Italy, 540; in Japan, 43, 598; in Java, 118; in Rumania, 580; in Russia, 600, 728; in S. Rhodesia, 476; in U.S.A., 108, 118, 119, 145, 205, 332, 333, 398, 461, 538, 539, 648; properties of virus of, 108, 234, 309, 401, 461, 525, 598; purification of virus of, 332, 599, 648; quantitative study of, 398, 526; relation of, to 'healthy potato virus', 318; to tomato mosaic, 731; to tomato streak, 333; serologic studies on, 43, 314, 398; shape of virus particles of, 234, 401, 525; size of virus particles of, 309; spread of virus of, in host tissues, 118, 598, 791; sterility caused by, 600, 728; studies on, 43, 118, 119, 313, 538, 581, 598, 648, 727, 791; symptoms of, on other hosts, 119; transmission of, to *Datura stramonium*, 120, 313; to *Nicotiana glutinosa*, 120, 313, 526; to *N. paniculata*, *N. tabacum* var. *angustifolia*, and *N. tomentosa*, 538; to tomato, 313, 333, 793; to various hosts, 119, 120; types of, 118, 314; virus of, affecting petunia, *Solanum nigrum*, and other hosts in U.S.A., 333.
— of tomato, control, 250, 541; effect of, on physiology of host, 402, 778; notes on, 731; occurrence in Canada, 250, 540; in Egypt, 749; in Great Britain, 731; in Rumania, 580; in Russia, 778; in U.S.A., 79, 206, 402; properties of virus of, 402; relation of, to 'healthy potato virus', 318; to tobacco mosaic, 731; to tomato glasshouse streak, 731; to tomato stripe, 79, 402, 731; tomato spotted wilt (?) mistaken for, 59; transmission of, by seed, 250, 540; to chilli, 402; to *Nicotiana affinis*, *N. sanderae*, *N. sylvestris*, petunia, and *Salpiglossis sinuata*, 206; to *Solanum dulcamara*, *S. nigrum*, and tobacco, 402; types of, 402.
[Mosaic] of vine in Czecho-Slovakia and Italy, 419; relation of, to leaf roll, 419.
— of wheat in Egypt, 749.
— -like disease of strawberry in U.S.A., 204.
—, see also Chlorosis, infectious, and Variegation, infectious.
Mottle leaf of lemon and orange in U.S.A., 434.
— —, see also Little leaf.
— virus of potato, see Potato, 'healthy potato virus' of.
Mottled stripe of sugar-cane in Porto Rico, 788.
Mottling of potato in Belgium, 585.
Moucheture of wheat, similarity of, to black germ of, in Siberia, 160.
Moulds in butter in U.S.A., 220, 695.
— in citrus packing houses in U.S.A., 616.
— in cream in U.S.A., 219.
—, modified hanging drop method for photomicrography of, 234.
— on cacao beans from W. Africa in England, 149.
— on timber in U.S.A., 344, 411.
Mountain ash, see *Pyrus aucuparia*.
— — (American), see *Pyrus americana*.
Mucor in soil in Austria, 191.
— on artificial silk in England, 446.
—, toxicity of dyes and mineral salts to, 693.
— *alternans* in soil in Austria, 191.
— *hiemalis*, *Dissophora nadsonii* (?) can parasitize, 339.
— *mucedo*, *Dissophora nadsonii* (?) can parasitize, 339.
— —, formation of volatile arsenic compounds by, 714.
— — on banana, 39.
— — and *M. pusillus*, toxicity of dyes and mineral salts to, 693.
— *racemosus*, beneficial effect of, on *Festuca pratensis* and *Poa pratensis*, 535.
— —, formation of volatile arsenic compounds by, 714.
— — in soil in Austria, 191.
— — on copra, lipase production by, 47.
— (?) *rhizophilus* on *Fegatella conica* in Italy, 235.
— *roseum*, toxicity of dyes and mineral salts to, 693.
Mucoraceae in soil in Czecho-Slovakia, 535; in Siberia, 191.
Mucuna pruriens, *Cercospora stizolobii* on, in Sierra Leone, 203.
Mulberry (*Morus*), *Aecidium mori* on, in China, 396.
—, *Bacterium mori* on, in Tasmania, 271.
—, *Phyllactinia corylea* on, in Réunion, 680.
Musa cavendishii, see Banana.
— *paradisiaca*, see Plantain.
— *sapientum*, see Banana.

[*Musa*] *textilis*, *Pythium* on, in the Philippines, 383.
Musca domestica, see Flies.
Mushrooms, (?) *Aspergillus* on, in U.S.A., 352.
—, *Cephalosporium costantinii* and *C. lamellaecola* on, in England, 72.
—, chemistry of the decomposition of manure by, 137.
—, *Clitocybe dealbata* on beds of, in England and France, 611.
—, cultivation of, in Great Britain, 72.
—, *Dactylium dendroides* on, in England, 353
—, effect of black oxide of uranium on growth of, in France, 197.
—, *Mycogone perniciosa* on, in England, 72; in France, 198; in U.S.A., 352.
—, *Oospora fimicola* on, in England, 72; in U.S.A., 352.
—, (?) *Penicillium* and *Pseudobalsamia microspora* on, in U.S.A., 352.
—, *Pseudomonas tolaasii* on, in England, 72; in U.S.A., 352.
—, (?) *Trichoderma* on, in U.S.A., 352.
—, *Verticillium* and *Xylaria vaporaria* on, in England, 72.
Muskmelon, see Melon.
Mustard (*Brassica alba* and *B. nigra*), horse-radish mosaic can infect, 352.
—, *Macrophomina phaseoli* can infect, 267.
—, *Phoma lingam* on, in England, 140.
—, *Plasmodiophora brassicae* on, in Russia, 346, 608.
Mycelium B 7 on pulpwood in Norway, 69.
— *radicis abietis* 1 on pine forming mycorrhiza, 778.
— — *atrovirens* on pine in Sweden, 386.
— — *nigrostrigosum* on pine forming mycorrhiza, 386, 778.
— — *strobi* 1 and *M. r. sylvestris* on pine forming mycorrhiza, 778.
Mycobacterium in soil in Europe, regarded as *Proactinomyces*, 324.
Mycoderma on prunes (dried) in U.S.A., 379.
— *brocianum* on man in N. Africa, 288.
Mycogone in soil in Austria, 191.
— *perniciosa* on mushrooms in England, 72; in France, 198; in U.S.A., 352.
Mycorrhiza, absence of, in insectivorous and hemiparasitic plants, 309.
— of beech, *Elaphomyces* forming, in Scotland, 529.
— of *Boronia* in New S. Wales, 311.
— of *Bucegia romanica* in Rumania, 583.
— of *Calluna vulgaris* not essential for growth, 712.
— of *Cattleya bowringiana*, nitrogen assimilation by *Rhizoctonia repens* from, 649.
— of conifers in Great Britain, 183; *Elaphomyces* forming, in Scotland, 529.
— of *Corallorrhiza innata*, nitrogen assimilation by fungus of, 649.
— of *Correa* in New S. Wales, 311.
— of *Digitalis ambigua* in Italy, 309.
— of *Eriostemon crowei* and *E. lanceolatus* in New S. Wales, 311; *Endogone* and *Rhizoctonia* forming, 312.
— of *Fegatella conica* in Italy, 235.
[Mycorrhiza] of grasses in Italy, 309.
— of *Laelia anceps*, nitrogen assimilation by *Rhizoctonia repens* from, 649.
— of larch in Great Britain, 183; *Cortinarius mucosus* forming, 183.
— of *Linaria vulgaris* in Italy, 309.
— of *Lobelia dentata* and *L. gibbosa* in Australia, 310.
— of *Lunularia cruciata* in Italy, 235.
— of orange in U.S.A., 506.
— of pine, factors affecting, 183; formation of, by *Cortinarius mucosus*, 183; by *Mycelium radicis atrovirens* and *M. r. nigrostrigosum*, 386; by various fungi, 778; occurrence in Great Britain, 183; in Sweden, 385, 386; in U.S.A., 385; studies on, 183, 385, 778.
— of *Potentilla tormentilla* and rye in Italy, 309.
— of *Sewardiella tuberifera*, 235.
— on sugar-cane, rôle of, in preventing degeneration, 394, 395.
— of trees and shrubs in U.S.A., 712.
— of various plants, *Rhizoctonia* forming, 309.
— of *Veronica allionii*, *V. chamaedrys*, *V. fruticulosa*, *V. officinalis*, *V. praecox*, and *Viola palustris* in Italy, 309.
— of wheat in Italy, 310, 312.
— of *Zieria smithii* in New S. Wales, 311.
—, see also Root nodules.
Mycosphaerella on *Pteridium aquilinum* in Scotland, 132.
— *begoniae* on begonia in Ecuador, 448.
— *fragariae* on strawberry, *Ascochyta fragariae* and *Ramularia tulasnei* stages of, 705; occurrence in Holland, 705; in U.S.A., 679.
— *grossulariae* on currants and gooseberry in Denmark, 640.
— *manihotis* on cassava, *Cercospora cassavae* imperfect stage of, 137; control, 137; occurrence in the Argentine, and Belgian Congo, 137; (?) in Tanganyika, 552; synonymy of, 137.
— *maydis* on maize in the Caucasus, 505.
— *pinodes* on peas in Holland, 483; in U.S.A., 609.
— *pomi* on apple in Queensland, 201; in U.S.A., 423.
— —, toxicity of hydrophilic colloidal sulphur to, 356.
— *rubi* on raspberry in Kenya, 9.
— *schoenoprasi* on leeks from Japan, 335.
— *tabifica* on beet in Rumania, 549. (See also *Phoma betae*.)
— *tulasnei* on pear in U.S.A., 301; *Cladosporium* imperfect stage of, 301.
— *zeae* on maize in the Caucasus, 505.
Myriogenospora paspali on *Paspalum scrobiculatum* in Sierra Leone, 203.
Myristica fragrans, see Nutmeg.
Myxomycetes, phylogeny and systematic position of, 115.
Myxosporium on *Tsuga canadensis* in U.S.A., 131; *Dermatea livida* (?) perfect stage of, 131.
— *carneum*, phloem necrosis in beech induced by products of, 44.

[*Myxosporium*] *sordidum* on begonia in Europe and S. America, 448.
Myxotrichum carminoparum on wood pulp in Norway, 69.
Myzus circumflexus, potato virus A transmitted by, 717.
— *persicae* transmission of bean mosaic by, in U.S.A., 414 ; of beet mosaic by, to spinach in U.S.A., 674 ; of cucumber mosaic by, to spinach in U.S.A., 673 ; of dahlia mosaic by, in U.S.A., 374, 697; of Hy. II and Hy. III viruses of *Hyoscyamus niger* by, 243 ; of potato leaf roll by, in Germany, 587 ; in Scotland, 48 ; of potato pseudo-net necrosis by, in Italy, 319 ; of potato virus A by, 717 ; of potato virus Y by, 587, 648 ; of potato virus diseases by, in Wales, 236 ; of tobacco veinbanding virus from potato by, 588 ; of tulip breaking by, in England, 633.

Naemacyclus niveus, *Lophodermium gilvum* synonym of, 254.
Naphthalene, use of, for the disinfection of greenhouses, 524.
Narcissus, *Cylindrocarpon radicicola*, *Fusarium bulbigenum*, and *Gibberella moniliformis* on, in England, 224.
—, *Ramularia vallisumbrosae* on, in Canada, 551.
—, *Stagonospora curtisii* on, in U.S.A., 79.
— *odorus* var. *rugulosus* and *N. tazetta* var. *orientalis*, yellow dwarf of onion can infect, 269.
Nasturtium officinale, see Watercress.
'Near wilt' of peas in U.S.A., 609.
Nectria on *Acer rubrum*, *A. spicatum*, ash, and basswood in U.S.A., 404.
— on butternut in U.S.A., 424.
(?) — on *Cinchona* in Indo-China, 147 ; *Fusarium* stage of, 147.
— on oak in U.S.A., 424.
— on palm in Belgium, 7.
— on poplar, *Prunus serotina*, and *Rhus typhina* in U.S.A., 404.
— on walnut in U.S.A., 424.
— *anisophila* on coffee in Costa Rica, 437 ; *Fusarium anisophilum* imperfect stage of, 437.
— — on *Erythrina*, *Gliricidia maculata*, *Inga*, *Phaseolus lunatus*, and *Poinciana regia* in Costa Rica, 438.
— *cinnabarina*, necrotic effect of, on phloem of lime tree, 44.
— *coccinea* on beech in Canada and U.S.A., 405 ; *Cryptococcus fagi* in relation to, 405.
— — var. *sanguinella* on poplar, legislation against, in Germany, 399, 800.
— *galligena* can infect algae, 307 ; beech, 44.
— — on apple in England, 353.
— — on poplar in Belgium, 677.
— (?) — on walnut in U.S.A., 424.
— — var. *major*, phloem necrosis in beech caused by products of, 44.
Nectriella versoniana (?) perfect stage of *Zythia versoniana*, 642.
Nematodes, *Arthrobotrys oligospora* and related species on, in U.S.A., 512.
—, (?) *Pythium* and other fungi capturing and killing, in U.S.A., 762.
—, see also *Heterodera*, *Tylenchus*, &c.
Nematospora on cotton in Nyasaland, 439 ; transmission of, by *Dysdercus*, 439.
— *coryli* on chilli in U.S.A., 594.
— — on coffee in Kenya, 8 ; *Antestia lineaticollis* in relation to, 8.
— — on cotton, 566 ; factors affecting, 775 ; occurrence in Rhodesia, 775 ; in S. Africa, 438 ; transmission of, by *Callidea dregei*, *Dysdercus*, and (?) Heteroptera, 439.
— — on grapefruit and orange in U.S.A., 594.
— — on *Phaseolus lunatus* in U.S.A., 2.
— — on tomato in U.S.A., 594.
— *gossypii* can infect tomato, 595.
— — on cotton, 566 ; occurrence in S. Africa, 438 ; transmission of, by *Callidea dregei*, *Dysdercus*, and (?) Heteroptera, 439.
— — on orange in U.S.A., 594.
— *nagpuri* on cotton, 566.
Nemura variegata, *Orphella* on, in Alpine waters, 512.
Neofabraea malicorticis can infect *Amelanchier alnifolia*, apricot, cherry, *Crataegus*, peach, plum, *Pyrus aucuparia*, *P. rivularis*, quince, and rose, 299.
— — on *Pyrus rivularis* in U.S.A., 299.
— —, toxicity of malachite green to, 299.
Nerium oleander, see Oleander.
Neurospora sitophila on bread in Russia, 625. (See also *Monilia sitophila*.)
Nicandra physaloides, tobacco mosaic can infect, 119.
— —, tobacco veinbanding can infect, 588.
Nickel chloride and nickel sulphate, toxicity of, to *Mucor*, 693.
Nicotiana, *Bacterium tabacum* can infect, 401.
— *acuminata*, tobacco mosaic can infect, 120.
— *affinis*, ring spot of, in Rumania, 580.
— —, tomato mosaic can infect, 206.
— *alata*, beet curly top can infect, 447.
— —, tobacco mosaic can infect, 120.
— *clevelandii*, tobacco mosaic can infect, 119.
— *glauca*, Hy. III virus of *Hyoscyamus niger* can infect, 243.
— —, tobacco 'female sterility virus' can infect, 599.
— —, tobacco mosaic can infect, 120.
— *glutinosa*, Hy. II and Hy. III viruses of *Hyoscyamus niger* can infect, 243.
— —, potato mosaic can infect, 731.
— —, ring spot of, in U.S.A., 473.
— —, tobacco mosaic can infect, 120, 313, 526.
— —, tobacco veinbanding can infect, 588.
— —, tomato spotted wilt can infect, 730.

[*Nicotiana glutinosa*], use of, in quantitative studies on tobacco mosaic, 526.
— *langsdorffii*, acquired immunity of, from tobacco ring spot, 120.
— —, tobacco 'female sterility virus' can infect, 599.
— —, tobacco mosaic can infect, 120.
— *longiflora*, potato mosaic can infect, 586.
— —, tobacco mosaic can infect, 120.
— *macrophylla*, tomato spotted wilt can infect, 730.
— *multivalvis*, acquired immunity of, from tobacco ring spot, 120.
— —, tobacco mosaic can infect, 119.
— *palmeri*, tobacco mosaic can infect, 120.
— *paniculata*, tobacco mosaic can infect, 119, 538.
— *quadrivalvis*, acquired immunity of, from tobacco ring spot, 120.
— —, ring spot of, in Rumania, 580.
— —, tobacco mosaic can infect, 119.
— *rusbyi*, tobacco mosaic can infect, 120.
— *rustica*, *Gloeosporium nicotianae* on, in Germany, 477.
— —, ring spot of, in U.S.A., 478.
— —, tobacco 'female sterility virus' can infect, 599.
— —, tobacco mosaic can infect, 119.
— —, tobacco veinbanding can infect, 588.
— *sanderae*, tobacco mosaic can infect, 120.
— —, tomato mosaic can infect, 206.
— *suaveolens*, tobacco mosaic can infect, 120.
— *sylvestris*, acquired immunity of, from tobacco ring spot, 120.
— —, tobacco mosaic can infect, 120.
— —, tomato mosaic can infect, 206.
— *tabacum*, see Tobacco.
— — var. *angustifolium*, tobacco mosaic can infect, 538.
— *tomentosa*, tobacco mosaic can infect, 119, 538.
— *trigmophylla*, tobacco mosaic can infect, 120.
— *triplex*, mosaic of, causing sterility, in Russia, 728.
— *viscosa*, ring spot of, in Rumania, 580.
Nicotine, use of, against the vector of yellow spot of pineapples in Hawaii, 304; with lime-sulphur, 453; with oil-Bordeaux, 774.
Nigrospora, antagonism of bacteria to, 109.
— on maize in U.S.A., 268.
— *oryzae* on maize in the Caucasus, 505; in Rumania, 20.
— — on rice in Indo-China, 146.
— *sphaerica* on banana in Eritrea, 745.
— — on elm in U.S.A., 125.
— — on maize in Tanganyika, 201.
Niloff 2 seed disinfection apparatus, 617.
Nipagin and Nipasol, composition and use of, in food preservation in Holland, 524.
Nitrites not accepted as the toxic products of *Fusarium vasinfectum*, 315.
Nitrogen, fungous tissues as a source of, for soil micro-organisms, 533.
— deficiency in sugar-cane in India, 536; in tomato in Jersey, 549.
— nutrition in relation to tobacco brown root rot in U.S.A., 477.
— trichloride, use of, against moulds in citrus packing houses, 615.
—, see also Fertilizers.
Noctuid, *Cordyceps sphingium* on a, in Sweden, 567.
'Nodal stalk rot' of sugar-cane in Hawaii, 723.
'Nooksan' of orange in Palestine, 285.
Nosperit, preparation Sch. 987 a concentrated form of, 31.
Nosprasit, composition of, 31.
—, effect of, on assimilation of wheat leaves, 383.
—, use of, against *Venturia inaequalis* on apple, 31, 297.
— 'O', use of, against *Cladosporium fulvum* on tomato, 233; against fruit diseases, 233, 295; against *Puccinia asparagi* on asparagus, 745; against *Septoria apii* on celery, 233; against *Venturia inaequalis* on apple, 32.
Nothofagus, *Cyttaria darwini*, *C. harioti*, *C. hookeri*, and *C. intermedia* on, in S. America, 116.
— *betuloides*, *Cyttariella skottsbergii* on, in S. America, 116.
Nummularia, formation of black lines in wood by, 544.
— *discreta* on apple in U.S.A., 100.
Nutmeg (*Myristica fragrans*), *Coryneum myristicae*, *Diplodia*, *Fomes noxius*, *Phytophthora*, and thread blights (Marasmioid) on, in Java, 425.
Nutrition of host in relation to virulence of fungi, 780. (See also Fertilizers.)

Oak (*Quercus*), *Aleurodiscus oakesii* on, in U.S.A., 601.
—, bacteriosis of, in Jugo-Slavia, 600.
—, *Ceratostomella quercus* on, 665; in Germany, 650.
—, — *ulmi* can infect, 665.
—, *Cronartium quercuum* on, in China, 396.
—, decay of, fire injury in relation to, in U.S.A., 409.
—, *Diplodia amphisphaeroides* on, in Italy, 746.
—, *Dissophora nadsonii* on, in the Caucasus, 339; parasitism of, to *Mucor hiemalis* and *M. mucedo*, 339.
—, 'dying-off' of, in Jugo-Slavia, 600.
—, *Erysiphe polygoni* on, in China, 725.
—, *Fomes robustus* on, in France, 795.
—, *Gloeodes pomigena* on, in U.S.A., 298.
—, *Hymenochaete rubiginosa* on, in France, 795.
—, *Leptosphaeria scolecosporarum* on, in Portugal, 726.
—, *Microsphaera alni* on, in China, 725.
—, — *quercina* on, factors affecting, 542;

occurrence in Germany, 578; in Italy, 542; in Réunion, 680; overwintering of, 542; study on, 542.
[Oak], *Nectria* on, in U.S.A., 424.
—, *Phytophthora cambivora* can infect, 337.
—, *Polyporus dryadeus* and *P. sulphureus* on, in France, 795.
—, *Stereum frustulosum* on, in France, 795.
—, — *hirsutum* on, in France, 664, 796.
—, — *spadiceum* on, in England, 734; in France, 796.
Oak-leaf virus disease of dahlia in U.S.A., 375, 697.
Oats (*Avena* spp.), (?) *Calonectria graminicola* on, in England, 754.
—, *Corticium solani* on, in S. Australia, 159.
—, effect of leaf recision on development of, 751.
—, *Erysiphe graminis* on, in Germany, 620.
—, *Fusarium culmorum* on, in Canada, 502.
—, *Gibberella saubinetii* can infect, 622.
—, grey speck of, in Germany, 87; in Sweden, 19.
—, *Helminthosporium avenae* on, control, 163; occurrence in Great Britain, 162; in Ireland, 266; in Scotland, 163; pycnidial production by, 162; study on, 163; varietal susceptibility to, 163.
—, — *sativum* can infect, 621.
—, magnesium deficiency disease of, in Czecho-Slovakia, 165.
—, *Ophiobolus graminis* can infect, 19.
—, *Plenodomus meliloti* on, in Canada, 636.
—, *Puccinia* on, estimation of injury caused by, 752; occurrence in Bulgaria, Poland, and Rumania, 150.
—, — *anomala* can infect, 274.
—, — *graminis* on, control by dusting, 504; effect of, on yield, 504; genetics of resistance to, 269, 281; occurrence in Canada, 280, 504; in Germany, 149; in the Irish Free State, 7; in U.S.A., 86, 269; overwintering of, 7; physiologic forms of, 86, 280; studies on, 86, 280, 504; varietal susceptibility to, 86, 269.
—, — *lolii* on, breeding against, 269; control by dusting, 272, 504; effect of, on yield, 504; of smut infection on, 211; host range of, 274, 364; occurrence in Canada, 211, 268, 364, 504; in Germany, 150, 273; in Mexico, 268; in Tunis, 272; in U.S.A., 268; physiologic forms of, 268, 274, 364; rate of fall of spores of, 498; varietal resistance to, 269; varieties of, 364.
—, — *triticina* can infect, 274.
—, reclamation disease of, in Denmark, 656; in Germany, 86.
—, *Ustilago avenae* on, artificial inoculation with, 431; breeding against, 269; chemical composition of spores of, 584; control, 12, 84, 144, 152, 153, 211, 279, 614, 617, 644; cytology of, 622, 650; effect of, on host, 209, 211; on susceptibility to *Puccinia lolii*, 211; factors affecting, 17, 144, 562, 644, 650; genetics of, 17; of resistance to, 562; hybridization of, with *U. kolleri*, 431, 622; occurrence in Canada, 211; in the Caucasus, 560; in Germany, 84, 152, 209, 279, 650; in Ireland, 211; in Russia, 617; in Tunis, 153; in U.S.A., 12, 144, 269, 431, 614, 622, 644; studies on, 17, 562, 622, 650; varietal resistance to, 269, 562.
[Oats, *Ustilago*] *kolleri* on, breeding against, 269; control, 211, 617; cytology of, 622; effect of, on host, 211; on susceptibility to *Puccinia lolii*, 211; factors affecting, 562; genetics of resistance to, 562; histology of, 756; hybridization of, with *U. avenae*, 431, 622; occurrence in Canada, 211; in the Caucasus, 560; in Ireland, 211; in Russia, 617; in U.S.A., 204, 269, 431, 562, 622; in Wales, 756; physiologic forms of, 756; studies on, 562, 622, 756; varietal resistance to, 204, 269, 562.
—, virus disease of, in Siberia, 306; transmission of, to barley, maize, *Panicum miliaceum*, rye, soy-bean, and wheat, 307.
Obscure disease of beans in France, 491.
— — of coffee in the Belgian Congo, 80.
— — of pepper in Java, 425.
— — of vine in Italy, 200.
Ocimum basilicum, *Peronospora* on, in Uganda, 422.
Oedocephalum glomerulosum in soil in Austria, 191.
Oidiodendron fuscum, *O. nigrum*, and *O. rhodogenum* on wood pulp in Norway, 69.
Oidiopsis on chilli, eggplant, *Hibiscus esculentus*, and tomato in Cyprus, 747.
Oidium in paper and pulp mill slimes in U.S.A., 545, 607.
— on avocado pear in Brazil, 707.
—, production of parchment-like membranes from, 607.
— *begoniae* on begonia in America and Denmark, 448.
— *chrysanthemi* on chrysanthemum in Germany, 642.
— *cynarae* on artichoke in Italy, 660.
— *euonymi-japonici* on *Euonymus japonicus* in Germany, 578.
— *heveae* on *Hevea* rubber, control, 323, 655; effect of, on yield, 655; factors affecting, 323; occurrence in Ceylon, 323, 655; in Java, Malaya, and Sumatra, 323; study on, 323.
— *hortensiae*, see *Microsphaera polonica*.
— *lactis* f. *musarum* on banana from Brazil and the Canaries, 39.
— *rotundatum* on man in U.S.A., 630.
— *tingitaninum* on citrus in Ceylon, 689.
— — on *Citrus mitis*, grapefruit, lemon, and orange in Ceylon, 167.
Oil, anthracene, use of, with Bordeaux mixture, 301.

[Oil]-asphalt, use of, as a wound dressing, 354.
— -Bordeaux, preparation and tests of, 774.
— —, use of, against *Dibotryon morbosum* on plum, 705.
— compounds as nutrients for moulds on wool, 24.
— -cresylic acid sprays, combination of, with fungicides, 711.
—, gas, use of, for killing bananas affected with *Fusarium oxysporum cubense*, 303.
—, hardened gloss, as a timber preservative, 344.
—, hydrocarbon and glyceride, as spray spreaders, 305.
— -lime-sulphur sprays, in relation to spray injury, 29.
—, motor, use of, as a timber preservative, 740.
— of cassia, eucalyptus, horsemint, lemon, peppermint, sassafras, thyme, and wormseed, toxicity of, to *Sclerotinia americana*, 229.
—, pine tar, with copper resinate, as a fungicide, 182.
—, saturated, injury caused by, 12.
— sludge as a spray spreader, 305.
—, winter white, use of, with Bordeaux mixture, 703.
—, see also Carbololie, Linseed oil, and Fish oil.
Oil palm (*Elaeis guineensis*), bud rot of, in Malaya, 354.
— —, crown disease of, in Malaya, 354.
— —, *Fomes noxius* on, in Malaya, 55, 354.
— —, *Fusarium* on, in Sierra Leone, 553.
— —, *Ganoderma applanatum* on, in the Belgian Congo, 80.
— —, leaf disease of, in Sierra Leone, 553.
— —, *Marasmius palmivorus* on, in Malaya, 355.
— —, *Phyllosticta* on, in Sierra Leone, 553.
Oiled wraps, use of, against apple scald, 423, 703.
Olea europaea, see Olive.
Oleander (*Nerium oleander*), *Bacterium tumefaciens* can infect, 81.
Oleocellosis of citrus in Italy, 746.
Olive (*Olea europaea*), *Cycloconium oleaginum* on, legislation against, in Italy, 522; in Spain, 127.
—, fruit spot (non-parasitic) of, in Italy, 458.
—, *Hysterographium fraxini* var. *oleastri* on, in Turkey, 707.
—, — *oleae* on, in Turkey, 706.
—, *Macrophoma dalmatica* on, in Italy, 707.
—, *Macrosporium oleae* on, in Italy, 745; *Pleospora herbarum* perithecial stage of, 745.
—, *Pseudomonas savastanoi* on, control, 458, 522; factors affecting, 521; legislation against, in the Argentine, 736; occurrence in Italy, 521; in U.S.A., 458; studies on, 458, 521.
Olpidium agrostidis on *Agrostis stolonifera* in England, 223.
— *pisi* on peas in Sweden, 329.
Omphalia flavida on coffee in Costa Rica, 168.
Onion (*Allium cepa*), *Botrytis allii* on, in Russia, 610; in S. Australia, 142.
—, *Cercospora duddiae* on, in Sierra Leone, 203.
—, *Colletotrichum circinans* on, nature of resistance to, 672; occurrence in S. Australia, 142; in U.S.A., 672.
—, *Fusarium* on, factors affecting, 317, 614; occurrence (?) in Russia, 610; in U.S.A., 613.
—, — *cepae* on, in Russia, 610; in S. Africa, 135; in U.S.A., 614; varietal susceptibility to, 614.
—, — *oxysporum* on, in Greece, 469.
—, — *solani* on, in S. Africa, 135.
—, — [*vasinfectum* var.] *zonatum* on, in U.S.A., 269, 614.
—, *Gibberella moniliformis* on, in U.S.A., 679.
—, *Macrosporium parasiticum* on, see *Pleospora herbarum* on.
—, *Peronospora destructor* on, *P. schleideni* synonym of, 484.
—, — *schleideni* on, control, 140, 485; factors affecting, 484; occurrence in Bermuda, 421; in Russia, 610; in U.S.A., 484; in Wales, 140; study on, 484; synonymy of, 484; varietal susceptibility to, 484.
—, *Phoma terrestris* on, in U.S.A., 269, 547.
—, *Phyllosticta cepae* on, in S. Africa, 192.
—, *Pleospora herbarum* on, in Russia, 610.
—, *Sclerotium cepivorum* on, breeding against, 140; control, 4; factors affecting, 4; occurrence in England, 140; in Russia, 610; in S. Africa, 4, 135; varietal resistance to, 140.
—, *Urocystis cepulae* on, in Russia and U.S.A., 610.
—, yellow dwarf of, in U.S.A., 269; transmission of, to *Narcissus*, 269.
Onobrychis sativa (*O. viciaefolia*), *Aplanobacter insidiosum* on, in Russia, 571.
Oomycetes, method for purification of cultures of, 580.
Oospora on sesame in Tanganyika, 552.
— *citri-aurantii* on citrus in Sierra Leone, 553.
— — on lemon in England and Sicily, 282.
— *d'agatae* synonym of *Torula sacchari*, 218.
— *fimicola* on mushrooms in England, 72; in U.S.A., 352.
— *lactis* on the fowl in U.S.A., 371.
— *medoacensis* renamed *Monilia medoacensis*, 662.
— *oryzetorum* on rice, legislation against, in U.S.A., 464.
— *verticillioides* on maize in the Caucasus, 505.
Ophiobolus graminis can infect barley,

bean, clover, oats, peas, rye, and vetch, 19; *Bromus ciliatus* and *Hordeum jubatum*, 621.
[*Ophiobolus graminis*], growth relationships of soil organisms with, 684.
— — on *Agropyron repens* and *A. tenerum* in Canada, 621.
— — on barley, effect of cultural practices on, 157; note on, 19; occurrence in the Argentine, 683; in Germany, 157.
— — on *Bromus sterilis* in the Argentine, 683.
— — on cereals, notes on, 503, 685; occurrence in France, 157, 685; in Germany, 503; in Kenya, 9; phenology of, 157.
— — on grasses in Kenya, 9.
— — on *Hordeum murinum*, rice, and rye in the Argentine, 683.
— — on wheat, antagonism of other fungi to, 18, 19, 684; control, 19, 156, 210, 279; effect of, on yield, 13; factors affecting, 18, 19, 157, 210, 279, 622, 683, 684; grass hosts of, 621; losses caused by, 683; loss of virulence of, 684; occurrence in the Argentine, 683; in Canada, 18, 621, 684; in France, 75; in Germany, 19, 156, 157, 210, 279; in Kenya, 13; in New Zealand, 496; in U.S.A., 18; studies on, 18, 19; toxic action of, 315.
— *herpotrichus* on barley in Germany, 150, 157.
— — on cereals in France, 685.
— — on rye in Germany, 150.
— — on wheat, control, 279; factors affecting, 157, 158, 210, 279; notes on, 19; occurrence in Germany, 19, 150, 157, 158, 210, 279.
— *miyabeanus* on rice in Japan, 532; in U.S.A., 12.
— *oryzinus* on rice in U.S.A., 655.
Opium poppy (*Papaver somniferum*), *Entyloma fuscum* on, in Rumania, 550.
Opuntia, *Sclerotium cacticola* on, in Holland, 634.
Opuntiella digitata on *Trissocladius* in Alpine waters, 512.
Orange (*Citrus aurantium*, *C. sinensis*, etc.), *Alternaria citri* on, in Australia, 215.
—, *Armillaria mellea* on, in S. Australia, 142; in Tunis, 302.
—, *Ascochyta citricola* on, in Portugal, 726.
—, *Botryosphaeria ribis* can infect, 283.
—, brown spot of, in Italy, 746; in U.S.A., 565.
—, — stain of, in U.S.A., 565; acetates and citral in relation to, 566.
—, cold storage spot of, in U.S.A., 565.
—, collar rot of, in Dominica, 21.
—, *Colletotrichum gloeosporioides* on, in India, 369.
—, *Corticium salmonicolor* on, in Kenya, 9.
—, — *solani* on, in Italy, 214.
—, creasing of, in Italy, 746.
— crinkle in S. Australia, 142.
—, *Cytosporina citriperda* on, in Sicily, 758; (?) synonym of *C. glaucescens*, 759.
[Orange, *Cytosporina*] *glaucescens* on, in North Africa, 758; *Septoria glaucescens* renamed, 759.
—, *Diaporthe citri* on, in Tunis, 302.
—, *Diplodia tubericola* can infect, 366.
—, 'faroosh' of, in Palestine, 284.
—, foliocellosis of, in Spain, 369.
—, *Fomes* (?) *fulvus* on, in Tunis, 302.
—, *Fumago* on, in Palestine, 284.
—, *Gloeodes pomigena* on, in S. Africa, 759.
—, *Gloeosporium citri* on, in Portugal, 726.
—, — *foliicolum* on, in China, 396.
—, — *hesperidearum* on, in Italy, 660.
—, *Glomerella cingulata* on, in Tunis, 302.
—, 'greasy spot' of, in Italy, 746.
—, gum spots of, in Italy, 746, 759.
— gummosis in Italy, 639.
—, little leaf of, in Palestine, 90.
—, mottle leaf of, in U.S.A., 434.
—, mycorrhiza of, in U.S.A., 506.
—, *Nematospora coryli* on, in U.S.A., 595.
—, — *gossypii* on, in U.S.A., 594.
—, 'nooksan' of, in Palestine, 285.
—, *Oidium tingitaninum* on, in Ceylon, 167.
—, *Penicillium digitatum* on, antagonism between *P. italicum* and, 168; control, 34, 759; infection process of, 167; occurrence in Italy, 168; in New S. Wales, 759; in Tunis, 302; study on, 167.
—, — *italicum* on, antagonism between *P. digitatum* and, 168; infection process of, 167; occurrence in Italy, 168; in Tunis, 302.
—, *Phoma citricarpa* on, from China, India, and Japan, 335.
—, *Physalospora rhodina* and *P. zeicola* can infect, 366.
—, *Phytophthora citrophthora* on, in Tunis, 302; in U.S.A., 368.
—, — *hibernalis* on, in U.S.A., 212.
—, — (?) *palmivora* on, in Ceylon, 77.
—, — *parasitica* on, control, 212, 368; factors affecting, 213; occurrence in Java, 212; in Sierra Leone, 553; in Tunis, 302; in U.S.A., 368; study on, 212; varietal susceptibility to, 368.
—, Polyporaceae on, in Tunis, 302.
—, *Pseudomonas citri* on, in Ceylon, 77, 433.
—, — *syringae* on, in Tunis, 302.
—, psorosis of, in Tunis, 302.
—, puffing of, in Italy, 746.
—, *Rhizoctonia lamellifera* on, 727.
—, sclerosis of, in Italy, 746.
—, *Sclerotinia minor* on, in Sicily, 282.
—, — *sclerotiorum* on, in Sicily, 282, (?) 758.
—, silver scurf of, in Palestine, 284.
—, *Sphaceloma fawcettii* on, see *Sporotrichum citri* on.
—, — — var. *viscosa* on, (?) in the Argentine, 689; in Brazil, 689.
—, *Sporotrichum citri* on, control, 166, 433, 689; factors affecting, 433; occurrence in Dominica, 21; in Jamaica, 166; in Sierra Leone, 202, 553; in

St. Lucia, 689; in Trinidad, 433; varietal susceptibility to, 166.
[Orange], water spot of, in U.S.A., 690.
Orchids, *Rhizoctonia* on, and asymbiotic growing of, 634.
Ornamental plants, diseases of, in U.S.A., 174.
Orphella on *Nemura variegata* in Alpine waters, 512.
— *coronata* on *Protonemura humeralis* in Alpine waters, 512.
Orthezia insignis transmitting mosaic disease of *Epiphyllum truncatum* (?) in Czecho-Slovakia, 294.
Oryza sativa, see Rice.
Ostenfeldiella synonym of *Plasmodiophora*, 468.
— *diplantherae* renamed *Plasmodiophora diplantherae*, 468.
Ostrya virginiana, *Aleurodiscus oakesii* on, in U.S.A., 601.
Ovulariopsis on *Erythrina indica* in Réunion, 680.
— *papayae* on papaw in Réunion, 680.
Oxalis stricta, *Puccinia maydis* on, in U.S.A., cytology of, 388.
Oxo-Bordeaux, use of, against *Aplanobacter michiganense* on tomato, 267; against *Phytophthora infestans* on potato, 240; against *Pseudoperonospora cubensis* on melon, 358.
Ozonium texanum on cotton in U.S.A., 440.

Paecilomyces, production of arsenical gas by, 384.
Paeonia, see Peony.
Pahala blight of sugar-cane in Porto Rico, 788.
Paint, protective action of, against *Merulius lacrymans* and other fungi, 261.
—, zinc-containing, as a cause of sulphur injury in glasshouses, 524.
Palms, *Colletotrichum allescheri* and *Nectria* on, in Belgium, 7.
—, (?) *Phytophthora* and (?) *Pythium* on, in Belgium, 8.
Palustrex, composition and use of, as a fungicide, 182.
Panax quinquefolium, see Ginseng.
Pandanus lambooensis, *Dimerosporium pandani* and *Gloeosporium pandani* on, in Samoa, 98.
Panicum frumentaceum, *Ustilago* (?) *panici-frumentacei* or *U.* (?) *paradoxa* on, in Nyasaland, 10.
— *miliaceum*, *Gibberella fujikuroi* on, stimulatory effect of, 590.
— —, *Ustilago panici-miliacei* on, in Russia, 616.
— —, virus disease of, in Siberia, 307.
— *trypheron*, *Sclerospora* on, in India, 551.
Pansy (*Viola tricolor*), curly top of beet affecting, in U.S.A., 446.
—, *Peronospora* (?) *violae* on, in Sweden, 329.
Papaver bracteatum, *Verticillium albo-atrum* on, in Germany, 117.
[*Papaver*] *nudicaule* and *P. orientale*, beet curly top virus can infect, 447.
— *rhoeas*, *Verticillium* on, in Italy, 338.
— *somniferum*, see Opium poppy.
Papaw (*Carica papaya*), *Diplodia tubericola* can infect, 366.
—, *Ovulariopsis papayae* on, in Réunion, 680.
—, *Physalospora rhodina* and *P. zeicola* can infect, 366.
—, *Phytophthora palmivora* on, in Ceylon, 77.
—, *Pythium aphanidermatum* on, in Porto Rico, 246.
Paper mills, moulds as slime-forming organisms in, in U.S.A., 545, 607. (See also Timber.)
Papularia vinosa (*Melanconium saccharinum*) on maize in Tanganyika, 552.
Paracrinkle of potato, note on, 648; relation of American leaf rolling mosaic to, 48.
Paraffin, use of, against *Alternaria citri* on orange, 215; against *Phytophthora parasitica* on orange, 213.
Paraformaldehyde, use of, against cereal rusts, 151, 271, 272; against *Sorosporium reilianum* on maize, 563.
Paranitrophenol, use of, against moulds of hides, 94.
Para-oxybenzoic acid esters, constituents of nipagin and nipasol, 523.
Parasitism of fungi, buffer content of sap in relation to, 314.
— — —, turgescence of host tissues in relation to, 715.
— of lichen fungi on their algal associates, 307.
Parasterina, Philippine species of, 248.
Paratrioza cockerelli in relation to psyllid yellows of potato, 424, 461; of tomato, 424.
Parinarium mobola, *Armillaria mellea* on, in S. Africa, 142.
Parsley (*Petroselinum sativum*) diseases, use of germisan against, 264.
Parsnip (*Pastinaca sativa*), *Armillaria mellea* on, in S. Australia, 142.
Parthenocissus tricuspidata, see Virginia creeper.
Paspalum scrobiculatum, *Myriogenospora paspali* on, in Sierra Leone, 203.
Passion fruit (*Passiflora edulis*), *Cladosporium* on, in Queensland, 40.
— —, *Macrosporium* on, in New S. Wales, 576; in Queensland, 41.
Passiflora herbertiana, *Cladosporium* on, in Queensland, 41.
Pastinaca sativa, see Parsnip.
Paulownia tomentosa, *Valsa paulowniae* on, in Japan, 603.
Paxillus panuoides on timber, action of, 68.
Peach (*Prunus persica*), *Bacterium pruni* on, in U.S.A., 145, 268.
—, *Botrytis cinerea* on, in U.S.A., 378.
—, *Cladosporium carpophilum* on, in U.S.A., 11, 573, 709.
—, *Diplodia tubericola* can infect, 366.
—, *Fusarium* on, in U.S.A., 378.

[Peach], *Gloeosporium perennans* can infect, 299.
— gummosis, control, 180; notes on, 181; occurrence in Egypt. 749; in Germany, 180; in Italy, 639.
—, little leaf of, in U.S.A., 99, 205.
—, little peach disease of, in U.S.A., 203.
— mosaic in U.S.A., 37.
—, *Neofabraea malicorticis* can infect, 299.
—, *Penicillium* on, in U.S.A., 378.
—, phony disease of, control, 146, 703; legislation against, in U.S.A., 528, 575; notes on, 575; occurrence in U.S.A., 146, 575, 679, 703.
—, *Phymatotrichum omnivorum* on, in U.S.A., 270.
—, *Physalospora rhodina* and *P. zeicola* can infect, 366.
—, 'plume' disease of, in Italy, attributed to *Thrips*, 229.
—, *Puccinia pruni-persicae* on, in China, 248.
—, — *pruni-spinosae* on, in Réunion, 680.
—, 'red suture' disease of, in U.S.A., 203.
—, *Rhizopus nigricans* on, in U.S.A., 378.
—, *Sclerotinia americana* on, control, 11, 102, 145, 229, 379, 573, 703, 709; factors affecting, 102, 228, 378; losses caused by, 228, 378; occurrence in Australia, Canada, and New Zealand, 228; in U.S.A., 11, 102, 145, 228, 378, 573, 709; in Victoria, 703; relation of *Conotrachelus nenuphar* and *Grapholitha molesta* to, 228; *S. fructicola* preferred as a name for, 228; study on, 228; varietal resistance to, 228.
—, — *fructicola* on, see *S. americana* on.
—, silver leaf of, in Italy, 492.
—, *Taphrina deformans* on, control, 451; notes on, 227; occurrence in Réunion, 680; in Switzerland, 451; in U.S.A., 227; varietal resistance to, 228.
—, *Verticillium dahliae* can infect, 76.
—, virus disease of, in U.S.A., 206, 454.
— yellows, note on, 203; occurrence in U.S.A., 203, 454, 518; transmission of, by *Macropsis trimaculata*, 518.
Pear (*Pyrus communis*), *Bacillus amylovorus* on, control, 13, 357, 701, 766; dissemination of, 700; by insects, 13, 701; factors affecting, 700; legislation against, in Bulgaria, 592; occurrence in Canada, 452; in Italy, 200; in U.S.A., 11, 12, 357, 700, 766; overwintering of, 12, 700; resistance of *Pyrus calleryana* to, 11; studies on, 700, 766.
—, bacterial disease of, in U.S.A., 13.
—, 'black end' of, in U.S.A., 103, 615; in Victoria, 574; varietal susceptibility to, 103, 574.
—, *Botrytis cinerea* on, 102.
—, 'cork' and 'drought' spots of, in U.S.A., 769.
—, *Fabraea maculata* on, in New S. Wales, 231.
—, *Fusarium oxysporum* on, in Greece, 469.
—, *Gloeodes pomigena* on, in England, 488.
[Pear], *Gymnosporangium koreaense* on, in China, 396.
—, internal breakdown of, in U.S.A., 102.
—, *Mycosphaerella tulasnei* on, in U.S.A., 301; *Cladosporium* imperfect stage of, 301.
—, *Phacidiella discolor* on, in Belgium, 8.
—, *Podosphaera leucotricha* on, in Germany, 746.
—, *Pseudomonas syringae* on, in U.S.A., 376; synonymy of, 376.
—, *Venturia pirina* on, ascospore discharge in, 296, 300, 746; control, 300, 451, 453, 639, 767, 774; estimation of intensity of infection by, 767; factors affecting, 746; occurrence in England, 453, 488, 639, 767, 774; in Germany, 746; in New Zealand, 296; in Switzerland, 451; in U.S.A., 300; stock influence on susceptibility to, 639; study on, 296; varietal susceptibility to, 300.
—, *Verticillium dahliae* on, in England, 488.
Pear, Japanese, see *Pyrus serotina*.
— × *Pyrus serotina*, see Pineapple pear.
Peas (*Pisum*), *Aphanomyces euteiches* on, control, 413, 609; factors affecting, 413; occurrence in France, 489; in U.S.A., 413, 609; regarded as secondary to bacteria, 413; varietal susceptibility to, 413.
—, *Ascochyta pinodella* on, in Holland, 483; in U.S.A., 609.
—, — *pisi* on, in Germany, 740; in Holland, 483.
—, bacteria on, causing wilt, in U.S.A., 412; *Aphanomyces euteiches* and *Fusarium* as secondary agents to, 413.
—, *Bacterium pisi* on, in U.S.A., 263.
—, clover mosaic can infect, 741.
—, *Colletotrichum pisi* on, in U.S.A., 355.
—, *Corticium solani* on, control, 609; effect of, on pea size, 671; occurrence in U.S.A., 133, 412, 609, 671.
—, *Erysiphe polygoni* on, in India, 551; in U.S.A., 412.
—, *Fusarium* on, in U.S.A., 413, 547; regarded as secondary to bacteria, 412.
—, — *martii* var. *pisi* on, in U.S.A., 609.
—, — *merismoides* var. on, in U.S.A., 263, (?) 412.
—, — *orthoceras* var. *pisi* on, control, 71; factors affecting, 71; nature of resistance to, 412; occurrence in U.S.A., 71, 412, 609; study on, 71; varietal resistance to, 71, 609.
—, *Melilotus alba* mosaic can infect, 741.
— mosaic in U.S.A., 414, 741; transmission of, to bean by *Macrosiphum pisi*, 414; by sap, 414, 741.
—, *Mycosphaerella pinodes* on, in Holland, 483; in U.S.A., 609.
—, 'near wilt' of, in U.S.A., 609.
—, *Olpidium pisi* on, in Sweden, 329.
—, *Ophiobolus graminis* can infect, 19.
—, *Peronospora viciae* and *Phymatotrichum omnivorum* on, in U.S.A., 412.

[Peas], *Pseudomonas pisi* on, in France, 489; in U.S.A., 412.
—, *Pythium* on, in U.S.A., 671.
—, — *epigynum* can infect, 331.
—, reclamation disease of, in Denmark, 656.
—, *Thielaviopsis basicola* on, in France, 489.
—, *Trichoderma lignorum* stimulating germination of, 535.
—, *Uromyces fabae* on, in Japan, 596.
Peat moss, trial of, as packing for apples, 703.
Pecan (*Carya pecan*), bacterial disease of, in U.S.A., 601.
—, *Cladosporium effusum* on, in U.S.A., 709, 798.
—, *Leptothyrium nervisedum* on, in U.S.A., 798.
—, rosette (zinc deficiency) of, in U.S.A., 339, 602.
—, (?) *Valsa nivea* on, in U.S.A., 270.
Pelargonium, *Bacterium tumefaciens* on, biochemistry of, 148; effect of ambient radiation and Hertzian waves on, 82; transmitted from chrysanthemum, 699; from *Salix caprea*, 797.
—, curly top of, in U.S.A., 446.
— *zonale*, *Bacterium tumefaciens* on, effect of cosmic and X-rays on, 680; immunization against, 496.
— —, leaf curl of, in Belgium and Germany, 514.
— —, (?) virus disease of, in England, 223.
Penicillium, antagonism of bacteria to, 109.
— in soil in Austria, 191; in China, 656; in Czecho-Slovakia, 535; in Siberia, 191; in U.S.A., 56.
— in sulphur fungicides in U.S.A., 107.
— on apple, effect of, on carbon dioxide production by, 34; occurrence in Switzerland, 8; in U.S.A., 295; sources of contamination by, 295; varietal susceptibility to, 423.
— on artificial silk in England, 446.
— on barley in relation to bronchial troubles in England, 511.
— on carrot in U.S.A., 4.
— on copra, lipase production by, 47.
— on hides in U.S.A., 94.
— on maize in U.S.A., 12.
— on man in England, 511; in S. America, 173.
(?) — on mushrooms in U.S.A., 352.
— on peach in U.S.A., 378.
— on pulp wood in U.S.A., 545.
— on termites in U.S.A., 461.
— *brevicaule*, formation of volatile arsenic, selenium, and tellurium compounds by, 714.
— — on artificial silk in England, 446.
— — on *Melilotus alba*, in relation to 'sweet clover disease' of cattle in Canada, 699.
— *bruno-violaceum* on cheese in Germany, 220.
— *chrysogenum*, production of an inhibitory substance by, 387.
[*Penicillium*] *citrinum* on cacao in England, 149.
— *crustaceum* can infect beet, 349.
— —, *Cephalosporium acremonium* f. *major* parasitizing, in Italy, 537.
— — on apple in Spain, 377.
— — on banana, 39.
— — on man in France, 631.
— — on sugar causing inversion in Czecho-Slovakia, 193.
— *digitatum* on citrus, control, 34; mixed inoculations with, 21; occurrence in England, 34; in Palestine, 21.
— — on lemon, antagonism between *P. italicum* and, 168; losses caused by, 282; mixed inoculations with, 168, 282; notes on, 282; occurrence in England, 282; in Italy, 168, 282.
— — on orange, antagonism between *P. italicum* and, 168; control, 34, 759; infection process in, 167; occurrence in Italy, 168; in New S. Wales, 759; in Tunis, 302; study on, 167.
— *duclauxi*, production of arsenical gas by, 384.
— *expansum* on apple, control, 226, 574, 703; factors affecting, 226; occurrence in New S. Wales, 703; in U.S.A., 226, 295, 574; sources of contamination by, 226, 295; study on, 226.
— — on bread in U.S.A., 757.
— *glaucum*, growth of, on sulphite cellulose, 535.
— — on bread in Russia, 625.
— — on coco-nut (copra) in Malaya, 355.
— — on man in the Sudan, 371.
— *italicum* on citrus, losses caused by, 282; mixed inoculations with, 21, 168, 282; occurrence in Palestine, 21.
— — on lemon, antagonism between *P. digitatum* and, 168; losses caused by, 282; mixed inoculations with, 168, 282; notes on, 282; occurrence in England, 282; in Italy, 168, 282.
— — on orange, antagonism between *P. digitatum* and, 168; infection process in, 167; occurrence in Italy, 168; in Tunis, 302.
— *notatum*, production of an inhibitory substance by, 387.
— *puberulum* on cheese in New Zealand, 696.
— *rubens* and *P. rubrum*, production of an inhibitory substance by, 387.
Pennisetum typhoideum, *Ustilago penniseti* on, in India, 367.
Pentathionic acid as the fungicidal agent of sulphur, 123.
— —, preparation and properties of, 460.
Peony (*Paeonia*), *Phytophthora paeoniae* on, in Japan, 176.
—, *Septoria paeoniae* on, in U.S.A., 205.
—, *Thielaviopsis basicola* on, in U.S.A., 355.
Pepper (betel), see *Piper betle*.
— (*Capsicum annuum*), see Chilli.
— (*Piper nigrum*), *Colletotrichum necator* on, in India, 267.

[Pepper], die-back of, in Java and Sumatra, 425.
—, obscure disease of, in Java, 425.
—, 'pollu' of, in India, 267.
Peregrinus maidis, transmission of stripe disease of maize by, in Cuba and Trinidad, (?) 143, 757.
Periconia in soil in Austria, 191.
Peridermium (Woodgate rust) on pine in U.S.A., 733.
— (?) *cerebroides* on pine, pycnidial stage of, in U.S.A., 68.
— *pini* var. *corticola* on pine in Russia, 406.
Perkinsiella saccharicida transmitting Fiji disease of sugar-cane in Australia, 787.
Peronospora on *Ocimum basilicum* in Uganda, 422.
— on tobacco in Queensland, 201.
— on weeds in relation to *Plasmopara viticola* on vine in France, 578.
— *destructor*, *Botrytis destructor* and *P. schleideni* synonyms of, 484.
— *ducometi* on buckwheat in Poland, 550; *P. fagopyri* synonym of, 550.
— *effusa* on spinach in U.S.A., 417.
— *fagopyri* synonym of *P. ducometi*, 550.
— *hyoscyami* on chilli in U.S.A., 732.
— — on tobacco, control, 146, 402; losses caused by, 249; notes on, 249; occurrence in U.S.A., 146, 249, 402, 538, 679, 732.
— — on tomato in U.S.A., 732.
— *parasitica* on Chinese cabbage in Japan, 1.
— — on crucifers in U.S.A., 546.
— (?) — on *Hibiscus esculentus* in Ceylon, 77.
— *schachtii* on beet in Austria, 135; in Czecho-Slovakia, 546.
— *schleideni* can infect *Allium schoenoprasum*, 484.
— — on *Allium fistulosum* in U.S.A., 416.
— — on onion, control, 140, 485; factors affecting, 484; occurrence in Bermuda, 421; in Russia, 610; in U.S.A., 484; in Wales, 140; study on, 484; synonymy of, 484; varietal susceptibility to, 484.
— — referred to *P. destructor*, 484.
— *trifoliorum* on lucerne in U.S.A., 177.
— *trigonellae* on *Trigonella foenum-graecum* in India, 611.
— *viciae* on peas in U.S.A., 412.
— (?) *violae* on pansy in Sweden, 329.
Persimmon (*Diospyros kaki*), *Cercospora kaki* on, in China, 396.
Pestalozzia, monograph of the genus, 57.
— on avocado pear in Brazil, 707.
— on banana in Sierra Leone, 202.
—, spores of, in the upper air in U.S.A., 385.
— *funerea* on pine in U.S.A., 332.
— *gossypii* on cotton in China, 395.
— *leprogena* on banana, 39.
— *macrotricha* on *Rhododendron* in U.S.A., 696.
— *mangiferae* on mango in Ceylon, 77.
[*Pestalozzia*] *rhododendri* on *Rhododendron* in U.S.A., 696.
— *sinensis* on *Ginkgo biloba* in China, 725.
— *stellata*, toxicity of selenium, sulphur, and tellurium to, 107.
— *tumefaciens* on *Abies* in Belgium, 677.
Petroselinum sativum, see Parsley.
Petunia, Hy. III virus of *Hyoscyamus niger* can infect, 243.
—, *Phytophthora infestans* on, in S. Australia, 142.
—, ring spot of, in U.S.A., 473.
—, tobacco mosaic can infect, 120; occurrence in U.S.A., 333.
—, tomato mosaic can infect, 206.
—, — spotted wilt can infect, 59, 730.
— *hybrida*, curly top of beet affecting, in U.S.A., 446.
— *nyctaginiflora*, potato mosaic can infect, 587.
— *violacea*, mosaic of, in Rumania, 580.
Phacidiella discolor on pear in Belgium, 8.
Phaeocytostroma ambigua on maize in Tanganyika, 552.
Phaeolus manihotis on cassava in Madagascar, 352.
Phakopsora zizyphi-vulgaris on *Zizyphus sativa* in China, 396.
Phalera bucephala, *Cordyceps militaris* on, in Denmark and Sweden, 567.
Phascolosoma vulgare, action of *Bacterium tumefaciens* on, 83.
Phaseolus, *Ascochyta* and *Colletotrichum* on, in Uganda, 422.
— *lunatus*, *Bacterium phaseoli* on, in U.S.A., 671.
— —, — *vignae* and *Diaporthe phaseolorum* on, in U.S.A., 2.
— —, *Elsinoe canavaliae* on, in Cuba, 742.
— —, *Macrophomina phaseoli* on, in U.S.A., 2.
— —, *Nectria anisophila* on, in Costa Rica, 438.
— —, *Nematospora coryli* and *Phytophthora phaseoli* on, in U.S.A., 2.
— —, *Sclerotinia sclerotiorum* on, in U.S.A., 780.
— —, tobacco ring spot can infect, 121.
— — var. *macrocarpus*, *Elsinoe canavaliae* on, from Jamaica, 335.
— — — —, tobacco ring spot can infect, 121.
— — var. *sieva*, tobacco ring spot can infect, 121.
— *multiflorus*, see Bean.
— *mungo* var., (?) *Heterosporium* on, in Nyasaland, 10.
— — and its var. *radiatus*, *Macrophomina phaseoli* can infect, 267.
— *vulgaris*, see Bean.
Phenol, toxicity of, to *Sclerotinia cinerea* and *Trichothecium roseum*, 523.
—, use of, as a timber preservative, 411.
—, see also Carbolic acid.
Phenosafranin as a stain for fungi, 384.
Phenyl salicylate, use of, against wood-staining fungi, 669.
Phenylthiourea and phenylthiourethan, toxicity of, to fungi, 304.

Phialophora verrucosa on man in U.S.A., 370; *Alternaria* believed to be a stage of, 370.
Phlebia aurantiaca can infect beech, 44.
Phleum pratense, *Puccinia lolii* can infect, 274.
Phloem necrosis in beech, 43.
— — in coffee, 43. (See also *Phytomonas leptovasorum* on.)
— — in lime trees, *Phlox suffruticosa*, tomato, and *Vitis gongyloides*, 43.
Phlox, beet curly top can infect, 447.
—, *Verticillium* on, in Italy, 338.
— *suffruticosa*, phloem necrosis in, 43.
Phoenix canariensis, *Fusarium* on, in U.S.A., 79.
— —, *Graphiola phoenicis* on, in U.S.A., 270.
— *dactylifera*, see Date palm.
— *reclinata*, *Fusarium* on, in U.S.A., 79.
Pholiota aurivella, can infect beech, 44.
— —, oidial formation in, 186.
— *squarrosa* on cherry in England, 353.
Phoma on *Echeveria multicaulis purpurea* in Italy, 27.
— on elm in U.S.A., 125.
— on fruit trees in Italy, 640.
— on *Melia azedarach* in Java, 426.
— on strawberry in U.S.A., 680.
—, physiological key for identification of, 24.
— *asparagi* on asparagus in China, 395.
— *betae* on beet in Austria, 135; in Czecho-Slovakia, 546. (See also *Mycosphaerella tabifica* on.)
— *camelliae* on tea in Malaya, 355.
— *chrysanthemi* on *Chrysanthemum indicum* in Italy, 660.
— *citricarpa* on orange from China, India, and Japan, 335.
(?) — *conidiogena* on elm in U.S.A., 125.
— *cookei* on vine in China, 395.
— *destructiva* can infect ivy and tomato, 24.
— — in butter in Irish Free State, 24; *Phyllosticta hedericola* identical with, 24.
— — on tomato, note on, 794; occurrence in Germany, 662; in Trinidad, 121, 794; in U.S.A., 121.
— —, resemblance of some strains of *Phoma lingam* to, 482.
— *douglasii* renamed *Blastophoma* (?) *douglasii*, 790.
— *encephalarti* on *Encephalartos horridus* in Somaliland, 536.
— *eriobotryae* on loquat in Italy, 641.
— *exigua* on flax in Holland, 372.
— *fici caricae* on fig in S. Africa, 192.
— *flaccida* on vine, control, 420; factors affecting, 353; note on, 486; occurrence in Algeria, 352; in France, 420; in Rumania, 486; study on, 420; varietal susceptibility to, 353.
— *gaillardiae* on *Gaillardia* in S. Africa, 764.
— *glumarum* on rice in China, 395.
— *hibernica* in butter, cream, milk, and water in Irish Free State, 24.
— *lingam* can infect tomato, 482.
[*Phoma lingam*] on cabbage in Ireland, 481; in U.S.A., 482.
— — on charlock in Ireland, 483.
— — on crucifers in U.S.A., 546.
— — on mustard in England, 140.
— — on swedes, control, 140, 609; notes on, 140; occurrence in England, 140; in Ireland, 7, 481; in New Zealand, 134, 481, 608; overwintering of, 7, 482; strains of, 481; studies on, 481, 608; transmission of, by *Atheta pseudocoriaria*, *Drosophila rubrostriata*, and other insects, 134; by seed, 7, 140, 482; from mustard, 140.
— —, resemblance of some strains of, to *P. destructiva*, 482.
— *oleandrina* on rose in France, 447.
— *pityella*, note on, 790.
— *radicis callunae* on *Calluna vulgaris* not essential for development, 713.
— *terrestris* on *Allium fistulosum* in U.S.A., 416, 547.
— — on *Allium schoenoprasum*, garlic, and leeks in U.S.A., 547.
— — on onion in U.S.A., 269, 547.
— — on shallot in U.S.A., 547.
— *viticola* on vine in China, 395.
Phomopsis on apple, biochemical notes on, 32; virulence of, 573.
— on citrus in Sierra Leone, 553.
— on *Cocos plumosa* in U.S.A., 79.
— on elm in U.S.A., 125. (See also *Diaporthe eres* on.)
— on *Rhododendron maximum* in U.S.A., 696.
— on tomato in Trinidad, 121.
—, virulence of species of, to apples, 573.
— *abietina* on pine, conidial formation in, 790.
— *californica*, see *Diaporthe citri*.
— *callistephi* on China aster in U.S.A., 448.
— *citri*, see *Diaporthe citri*.
— *coneglanensis*, virulence of, to apple, 573.
— *crotalariae* pycnidial stage of *Diaporthe crotalariae*, 765.
— *cytosporella* on lemon in Italy, 746.
(?) — *juniperovora* on juniper and *Thuja occidentalis* in U.S.A., 251.
— *microspora* on *Pseudotsuga taxifolia* in Germany, 789.
— *oblonga* pycnidial stage of *Diaporthe eres*, 126.
— *occulta* pycnidial stage of *Diaporthe conorum*, 132.
— *phoenicicola* on date palm in Tunis, 302.
— *tuberivora* on potato in Canada, 241.
— *vexans* on eggplant in China, 395.
Phony peach disease, control, 146, 703; legislation against, in U.S.A., 528, 575; notes on, 575; occurrence in U.S.A., 146, 575, 679, 703.
Phosphorus, see Fertilizers.
Photo-chemical spotting of New Zealand apples in England, 179.
Phragmidium on rose in U.S.A., 633.
— *imitans* on raspberry in Canada, 678.

[*Phragmidium*] *mucronatum* on rose in Egypt, 174.
Phragmites, *Sclerospora macrospora* on, in Italy, 537.
Phycomycete on tobacco in U.S.A., 145.
Phyllachora, species of, from American tropics, 396.
— *begoniae* on begonia in Ecuador, 448.
Phyllactinia corylea on jasmine in India, 395.
— — on medlar in Italy, 181.
— — on mulberry in Réunion, 680.
Phyllocactus gaertneri, mosaic of, in Germany, 570.
Phyllostachys, see Bamboo.
Phyllosticta on *Hippeastrum* in U.S.A., 80.
— on oil palm in Sierra Leone, 553.
— on rice in Japan, 533.
— *batatae* on sweet potato in Sierra Leone, 553.
— *begoniae* on begonia in Brazil, France, Germany, Italy, and Portugal, 448.
— *betae* on beet in Italy, 660.
— *caryotae* on *Caryota ochlandra* in China, 725.
— *cepae* on onion in S. Africa, 192.
— *hedericola* identical with *Phoma destructiva*, 24.
— *maculiformis* on chestnut in France, 252.
— *mali* on apple in Spain, 330.
— *maximi* on *Rhododendron maximum* in U.S.A., 696.
— (?) *nicotiana* on tobacco in Rhodesia, 476.
— *phaseolorum* on bean in Spain, 330.
— *rabiei*, transference of, to *Ascochyta* not accepted, 137. (See also *Ascochyta rabiei*.)
— *roberti* on *Ficus elastica* in Portugal, 726.
— *rosarum* renamed *Sphaceloma rosarum*, 96.
— *saccardoi* on *Rhododendron maximum* in U.S.A., 696.
— *solitaria* on apple, control, 100, 572; factors affecting, 701; occurrence in U.S.A., 100, 572, 701; sporulation of, 701; study on, 701.
— *zeina* on maize in the Caucasus, 505.
Phyllostictella draconis on *Dracaena draco* in Italy, 293.
Phymatotrichum omnivorum on cotton, 566; control, 287, 628; effect of anaerobic conditions on, 216; of plant extracts on growth of, 691; occurrence in U.S.A., 216, 270, 287, 516, 627, 628, 691; overwintering of, 628; persistent strands of, 628; sclerotial formation in, 287, 627; studies on, 216, 287, 627, 628, 691; varietal resistance to, 270.
— — on cottonwood in U.S.A., 516.
— — on lucerne in U.S.A., 516.
— — on peach in U.S.A., 270.
— — on peas in U.S.A., 412.
Physalis alkekengi, 'healthy potato virus' can infect, 318.
— —, tobacco mosaic can infect, 120.
— —, *Verticillium albo-atrum* can infect, 117.
[*Physalis*] *angulata*, 'daon lidah' of tobacco affecting, in Sumatra, 471.
— —, tobacco mosaic can infect, 119.
— *peruviana*, *Entyloma physalidis* on, in Tanganyika, 201.
— —, tobacco mosaic can infect, 119.
— *pubescens*, *Stemphylium solani* on, in U.S.A., 60.
— —, tobacco veinbanding virus can infect, 588.
Physalospora, similarity of *Diplodia* stages of *Tryblidiella* and of, 791.
— *baccae* on vine in Rumania, 486.
— *cydoniae*, antagonism of bacteria to, 109.
— — on apple, control, 100; occurrence in Belgium, 8; in Rumania, 550; in U.S.A., 100.
— — on loquat in China, 396.
— — on vine in Tunis, 487.
— *elasticae* on *Ficus elastica* in Portugal, 726.
— *rhodina* can infect avocado, cotton, fig, grapefruit, mango, orange, papaw, peach, *Ricinus communis*, sweet potato, and watermelon, 366.
— —, *Diplodia gossypina* and *D. natalensis* imperfect stages of, 366.
— — on maize in U.S.A., 366.
— *zeicola* can infect avocado, cotton, fig, grapefruit, mango, orange, papaw, peach, *Ricinus communis*, sweet potato, and watermelon, 366.
— — on maize in Tanganyika, 552; in U.S.A., 366; *Diplodia frumenti* imperfect stage of, 366.
Physarum cinereum on *Rhododendron* in U.S.A., 697.
— *gyrosum* on begonia in Germany, 448.
Physiological disease of maize in the Caucasus, 505.
— — of walnut in U.S.A., 601.
— spotting of apple in Canada, 453.
Physoderma zeae-maydis on maize in U.S.A., 431, 495.
Phytomonas (bacterial) on bean in Denmark, 348.
— *hederae* on ivy in U.S.A., 98.
— *rathayi*, see *Bacterium rathayi*.
— *rubrilineans* on sugar-cane, control, 245; occurrence in India, 551; in Japan, 555; in Queensland, 245; study on, 555; varietal resistance to, 555.
— *viridiflava* var. *concentricum* on bean in Denmark, 348.
— (protozoal) *leptovasorum* on coffee, 43; in Surinam, 435; *Rhizoecus coffeae* and other insects in relation to, 435.
Phytophthora, annotated host index of, 594.
—, method for purification of cultures of, 580.
— on *Artocarpus integrifolia* in India, 76.
— on date palm in N. Africa, 627.
— on *Gloxinia* in Germany, 97.
— on nutmeg in Java, 425.
(?) — on palm in Belgium, 8.
— on pineapple in the Philippines, 383.
— on *Piper betle* in India, 420.
— *arecae* on areca palm in India, 76.

[*Phytophthora*] *cactorum* on *Rhododendron* in U.S.A., 696.
— — on strawberry in Ireland, 266.
— *cambivora* can infect oak, 337.
— —, legislation against, in Portugal, 672.
— — on beech in England, 334.
— — on chestnut in England, 334; in U.S.A., 337.
— *capsici* on chilli, comparison of, with *P. parasitica*, 112; control, 496; losses caused by, 535; notes on, 535; occurrence in the Argentine, 535; in Porto Rico, 246; in U.S.A., 112, 496, (?) 732; study on, 112.
— *cinnamomi* on pineapple in Hawaii, 106, 303; *Pseudopythium phytophthoron* synonym of, 106.
— — on *Rhododendron* in U.S.A., 696.
— (?) — on strawberry in Scotland, 7.
— *citrophthora* on citrus, control, 90, 212, 690; factors affecting, 367; notes on, 212, 367; occurrence in Italy, 565; in Porto Rico, 367; in U.S.A., 89, 212, 690.
— — on lemon, control, 368; notes on, 281, 283; occurrence in Sicily, 281; in U.S.A., 281, 368; varietal susceptibility to, 368.
— — on orange in Tunis, 302; in U.S.A., 368.
— *colocasiae* on *Colocasia esculenta* in China, 724.
— — on *Piper betle* in Malaya, 355.
— *cryptogea* var. *richardiae* on tulip in England, 140.
— *erythroseptica* on potato, specialization of parasitism of, 184.
— *hibernalis* on citrus in S. Australia, 141.
— — on orange in U.S.A., 212.
— *infestans* on eggplant in France, 75.
— — on petunia in S. Australia, 142.
— — on potato, breeding against, 190, 390; control, 76, 110, 240, 390, 391, 421, 491, 496, 613, 654, 715, 718, 774; on seed tubers, 549; factors affecting, 141, 490, 491; losses caused by, 110, 266, 491, 613; notes on, 75, 249; occurrence in Austria, 187; in the Channel Islands, 110, 549; in Denmark, 715; in England, 141, 774; in France, 75, 76, 490, 491; in Germany, 266, 465, 653, 718; in India, 420; in Réunion, 680; in U.S.A., 121, 190, 240, 390, 391, 496, 613, 654; in Wales, 236; physiologic forms of, 390, 465; spray warnings against, in France, 76; in U.S.A., 241, 613; studies on, 240, 390, 465; varietal resistance to, 187, 613, 715.
— — on *Solanum caldasii* and *S. commersonii* in France, 75.
— — — — *etuberosum* (? *S. edinense*) in Germany, 390.
— — — — *laciniatum* in France, 75.
— — on tomato, factors affecting, 249; notes on, 249; occurrence in France, 75; in Germany, 662; in Jersey, 549; in U.S.A., 249.
[*Phytophthora infestans*], resistance of *Solanum demissum* to, 75, 190, 390.
— *meadii* on pineapple in Hawaii, 303.
— *megasperma* on potato in Northern Ireland, 466.
— *melongenae* on pineapple in Hawaii, 303.
— *omnivora* on begonia in Germany, 448.
— *paeoniae* can infect tomato, 176.
— — on peony in Japan, 176.
— *palmivora* on cacao, 207; control, 523; occurrence in Tanganyika, 552.
— — on coco-nut, eradication against, 435; occurrence in Ceylon, 77; in Surinam, 435.
— — on *Hevea* rubber in Ceylon, 77.
— (?) — on orange in Ceylon, 77.
— — on papaw in Ceylon, 77.
— *parasitica*, comparison of, with *P. capsici*, 112.
— — on citrus, control, 192; occurrence in Italy, 565; in U.S.A., 192, 212.
— — on lemon in U.S.A., 368.
— — on orange, control, 212, 368; factors affecting, 213; occurrence in Java, 212; in Sierra Leone, 553; in Tunis, 302; in U.S.A., 368; study on, 212; varietal susceptibility to, 368.
— — on pineapple in Hawaii, 303.
— — on tomato in U.S.A., 121.
— —, *Trichoderma lignorum* parasitizing, 192.
— — var. *microspora* on pineapple in Guadeloupe, 489.
— — *nicotianae* on tobacco, breeding against, 146; control, 145, 398, 401; factors affecting, 118, 554; legislation against, in Mauritius, 554; notes on, 471; occurrence in Java, 118; in Mauritius, 554; in Porto Rico, 398, 401; in Sumatra, 471; in U.S.A., 145, 146, 793; study on, 793; toxic action of, 793; varietal resistance to, 146.
— *phaseoli* on *Phaseolus lunatus* in U.S.A., 2.
— *richardiae* on *Zantedeschia aethiopica* in U.S.A., 26.
Picea, see Spruce.
Pigeon pea (*Cajanus indicus*), *Cercodeuterospora trichophila* on, in Italian Somaliland, 246.
— —, *Corticium solani* on, in Sierra Leone, 203.
Pine (*Pinus*), *Amanita muscaria* on, forming mycorrhiza, 778.
—, *Armillaria mellea* on, control, 131, 799; fires in relation to, 799; occurrence in France, 799; in Scotland, 130; in S. Africa, 142; in Switzerland, 195; studies on, 130, 195.
—, *Bifusella linearis* on, in Germany, 667; *Hypoderma lineare* synonym of, 667.
—, *Boletinus porosus*, *Boletus bovinus*, *B. castaneus*, *B. granulatus*, and *B. luteus* on, forming mycorrhiza, 778.
—, *Botrytis cinerea* on, in Czecho-Slovakia, 340.
—, canker of, in U.S.A., 734.
—, *Ceratostomella* on, in Germany, 738; in Japan, 606.

[Pine, *Ceratostomella*] *ips* on, in Japan, 606 ; *Ips* spp. in relation to, 606.
—, *Cronartium comptoniae* on, *Tuberculina maxima* parasitizing, in Canada, 543.
—, — *quercuum* on, in China, 396.
—, — *ribicola* on, control, 480, 604, 739 ; cytology of, 668 ; field inoculations with, 407 ; legislation against, in U.S.A., 381, 400 ; method of determining age of infection by, 603 ; notes on, 480 ; occurrence in Canada, 341, 480, 543 ; in N. America, 493 ; in U.S.A., 203, 356, 400, 407, 543, 603, 604, 668, 679, 739, 799 ; *Ribes* eradication against, in U.S.A., 203, 356, 739, 799 ; specific susceptibility to, 341 ; studies on, 341, 407 ; *Tuberculina maxima* parasitizing, 543 ; virulence of strains of, 407.
—, *Crumenula abietina* on, in Germany, 667 ; in Spain, 480 ; perfect stage of *Brunchorstia destruens*, 667.
—, *Dasyscypha calycina* on, in Poland, 550.
—, — *ellisiana* on, in U.S.A., 733.
—, dying-off of, in France, 603.
—, *Elaphomyces* as mycorrhizal symbiont of, in Scotland, 529.
—, *Elytroderma deformans* on, in Canada and U.S.A., 254 ; *Hypoderma deformans* renamed, 254.
—, *Fomes annosus* on, factors affecting, 738, 799 ; occurrence in France, 799 ; in Germany, 738 ; in Poland, 550 ; study on, 738.
—, *Graphium* on, in Japan, 606.
—, *Hypoderma desmazierii* can infect, 255 ; occurrence in Germany, 604, 667 ; study on, 604 ; synonymy of, 667.
—, *Hypodermella concolor* on, in Canada and U.S.A., 255.
—, — *lacrimiformis*, *H. limitata*, and *H. sulcigena* on, in U.S.A., 255.
—, *Lactarius chrysorheus* on, forming mycorrhiza, 778.
—, — *deliciosus* on, forming mycorrhiza, 386, 778.
—, *Lophodermium pinastri* on, in Germany, 68, 604.
—, *Mycelium radicis abietis* 1 on, forming mycorrhiza, 778.
—, — — *atrovirens* on, in Sweden, 386.
—, — — *nigrostrigosum* on, forming mycorrhiza, 386, 778.
—, — — *strobi* 1 and *M. r. sylvestris* 1 on, forming mycorrhiza, 778.
—, mycorrhiza of, factors affecting, 183 ; formation of, by *Cortinarius mucosus*, 183 ; by *Mycelium radicis atrovirens* and *M. r. nigrostrigosum*, 386 ; by various fungi, 778 ; occurrence in Great Britain, 183 ; in Sweden, 385, 386 ; in U.S.A., 385 ; studies on, 183, 385, 778.
—, *Peridermium* (Woodgate rust) on, in U.S.A., 773.
—, — (?) *cerebroides* on, pycnidial stage of, in U.S.A., 68.
—, — *pini* var. *corticola* on, in Russia, 406.
[Pine], *Pestalozzia funerea* on, in U.S.A., 332.
—, *Phomopsis abietina* on, conidial formation in, 790.
—, *Polyporus borealis* on, in Germany, 739.
—, *Pullularia pullulans* on, in Germany, 605.
—, *Pythium* on, 405.
—, — (?) *de Baryanum* on, in the Philippines, 383.
—, red staining of, in Canada, 123.
—, *Rhizina undulata* on, in Poland, 550.
—, *Rhizoctonia* on, 405.
—, — *lamellifera* on, in Rhodesia, 727.
—, *Schizophoma* (?) *pini* on, conidial formation in, 790 ; *Sphaeronema pityophilum* synonym of, 790.
—, *Sclerophoma pityophila* and *S. strobi* on, conidial formation in, 790.
—, *Septoria acicola* on, in U.S.A., 332.
—, *Stictophoma acicola* on, conidial formation in, 790 ; *Sphaeronema acicola* renamed, 790.
—, *Trametes pini* on, in Canada, 123.
Pine oil, toxicity of, to *Epidermophyton floccosum*, *Microsporon fulvum*, *Sporotrichum schenckii*, *Trichophyton granulosum*, *T. mentagrophytes*, and *T. purpureum*, 291.
— -tar oil and copper resinate, use of, as a fungicide, 182.
Pineapple (*Ananas sativus*), leaf spotting of, caused by *Pseudococcus brevipes* in Hawaii, 521.
—, *Phytophthora* on, in the Philippines, 383.
—, — *cinnamomi* on, in Hawaii, 106, 303 ; *Pseudopythium phytophthoron* synonym of, 106.
—, — *meadii* and *P. melongenae* on, in Hawaii, 303.
—, — *parasitica* on, in Hawaii, 303.
—, — — var. *microspora* on, in Guadeloupe, 489.
— wilt in Hawaii, 520 ; transmission of, by *Pseudococcus brevipes*, 520.
— yellow spot in Hawaii, 304 ; transmission of, by *Thrips tabaci*, 304.
Pineapple pear (*Pyrus communis* × *P. serotina*), (?) *Clitocybe tabescens* and *Sphaeropsis* on, in U.S.A., 680.
Pinus, see Pine.
Piper betle, *Phytophthora* on, in India, 420.
— —, — *colocasiae* on, in Malaya, 355.
— —, *Rhizoctonia* on, in India, 420.
— —, *Sclerotium rolfsii* on, in India, 420 in Malaya, 355.
— *nigrum*, see Pepper.
Piricularia grisea on *Eleusine indica* in China, 395.
— *oryzae* on *Eleusine coracana* in Ceylon, 77.
— — on rice, control, 533 ; factors affecting, 533, 784 ; occurrence in India, 266 ; in Japan, 532, 784 ; studies on, 532, 784 ; varietal susceptibility to, 266 ; viability of, 532.
Pistacia, *Septoria gasparrini* on, in Italy, 660.

Pistachio nut (*Pistacia vera*), *Fomes rimosus* on, in Russian Central Asia, 254.
— —, *Fusarium oxysporum* on, in Greece, 469.
Pisum, see Peas.
Pittosporum, *Rhizoctonia lamellifera* on, in Rhodesia, 727.
Pityogenes chalcographus in relation to *Ceratostomella penicillata* on spruce in Switzerland, 409.
Pityrosporum malassezi, synonym of *P. ovale*, 442.
— *ovale* on man in India, 442; synonymy of, 442.
Plane tree, see *Platanus*.
Plant diseases, bibliography of, for 1932, 775; of environmental factors in relation to, 107.
— —, co-operation in the study of, 313.
— —, dusting against, in Holland, 304.
— — in British Guiana, 469; in Canada, 551; in France, 76; in Italy, 491; in Kansas, 494; in Massachusetts, 494; in Mauritius, 115; in Siberia, 306; in S. Rhodesia, 748; in U.S.A., 493.
— —, influence of environmental conditions on, 108.
— —, organization of research on, in Russia, 577; in Spain, 335.
— —, relation of wild hosts to, 578.
— —, Russian key to, 306.
— —, Russian text-book of, 182.
— —, standardization of common names of, 233.
— materials, decomposition of, by soil micro-organisms, 393.
— pathology, establishment of Division of, at the Rockefeller Institute for Medical Research, Princeton, 107.
— protection in the Belgian Congo, history of, 524.
— — services, in France, 256; in Holland, 306; in Hungary, 399.
— virus diseases, English book on, 776.
— — —, English survey of research on, 647.
— — —, French survey of, 308.
Plantago, tomato spotted wilt virus can infect, 59.
Plantain (*Musa paradisiaca*), bunchy top of, *Cercospora musae*, *Fusarium*, and *F. oxysporum cubense* on, in Ceylon, 77.
—, *Gloeosporium musarum* on, in Ceylon and India, 773.
Plasmodiophora; *Clathrosorus*, *Ligniera*, *Membranosorus*, *Ostenfeldiella*, *Sorodiscus*, *Sorosphaera*, and *Spongospora* synonyms of, 468.
— *brassicae* on *Barbarea rupicola* in Russia, 346.
— — on Brussels sprouts in Denmark, 608; in Germany, 670.
— — on cabbage, control, 233, 355, 493; factors affecting, 493; method of infection by, 347; occurrence in Denmark, 608; in Germany, 233, 670; in Lithuania, 493; in Russia, 346; in U.S.A., 355; varietal resistance to, 346, 608, 670.
[*Plasmodiophora brassicae*] on *Carrichtera vella* in Russia, 346.
— — on cauliflower in Denmark, 608; in U.S.A., 355.
— — on charlock in Denmark, 608; in Russia, 346.
— — on *Cochlearia danica* in Russia, 346.
— — on Cruciferae, method of infection by, 347; nature of resistance to, 346; occurrence in Denmark, 608; in Russia, 346.
— — on *Hesperis lutea*, *Iberis pinnata*, *I. umbellata*, and mustard in Russia, 346.
— — on rape in New Zealand, 412.
— — on *Succovia balearica* in Russia, 346.
— — on swedes, control, 609, 709; occurrence in Denmark, 608, 709; in New Zealand, 608; varietal resistance to, 609.
— — on turnips, genetics of resistance to, 670; nature of resistance to, 347; occurrence in Denmark, 608; in Scotland, 6; in Sweden, 670; varietal resistance to, 6, 608, 670.
— — on *Turritis glabra* in Russia, 346.
— — on wallflower in Denmark, 608.
— —, specialization in, 608.
— *diplantherae*, *Ostenfeldiella diplantherae* renamed, 468.
Plasmopara halstedii on sunflower in Russia, 571.
— *viticola* on vine, breeding against, 548; control, 8, 72, 73, 74, 138, 139, 198, 199, 200, 352, 419, 420, 674; effect of flavescence on resistance to, 675; factors affecting, 8, 72, 198, 265, 352; forecasting attacks of, 72, 73; losses caused by, 199, 265; notes on, 72, 419, 578; occurrence in Algeria, 198; in France, 72, 73, 74, 75, 138, 198, 199, 200, 265, 352, 419, 420, 578, 674, 675; in Germany, 74, 548; in Italy, 73, 199; in Sierra Leone, 553; in Switzerland, 8, 314, 548; overwintering of, 138; phenology of, 73; sap buffer content in relation to, 314; use of, in testing new fungicides, 577; varietal resistance to, 73, 548.
Platanus, *Gnomonia veneta* on, control, 251; *Discula platani* and *Gloeosporium nervisequum* stages of, 735; factors affecting, 735, 796; occurrence in France, 796; in Italy, 735; in U.S.A., 251; study on, 735.
— *occidentalis*, *Gloeodes pomigena* on, in U.S.A., 206.
Plectodiscella veneta, see *Elsinoe veneta*.
Plenodomus chelidonii and *P. destruens*, antagonism of, to *Ophiobolus graminis*, 684.
— *meliloti* on *Amaranthus retroflexus* and *Axyris amaranthoides* in Canada, 636.
— — on clover, lucerne, and *Melilotus alba* in Canada, 635.
— — on oats in Canada, 636.
— *nigricans* on *Sansevieria stuckii* in Somaliland, 536.
Pleocyta sacchari on sugar-cane in Porto Rico, 246; in Tanganyika, 552; *Melanconium sacchari* synonym of, 246.

Pleospora in air of apple orchards in England, 32.
— *bataanensis* on *Agave americana* in India, 395.
— *herbarum* on citrus in Cyprus, 747; in Italy, 746; (?) in S. Australia, 142.
— — on onion in Russia, 610.
— —, perithecial stage of *Macrosporium oleae*, 745.
Pleurotus ostreatus can infect beech, 44.
— —, decomposition of wood by, 343.
Plum (*Prunus domestica*), bacterial gummosis of, in U.S.A., 180.
—, *Cladosporium herbarum* on, in Austria, 575.
—, *Clasterosporium carpophilum* on, in Switzerland, 314.
—, *Dematium pullulans* on, see *Pullularia pullulans* on.
—, diamond canker of, in U.S.A., 79, 180.
—, *Diaporthe perniciosa* on, in Belgium, 677.
—, *Dibotryon morbosum* on, legislation against, in Bulgaria, 592; occurrence in Canada, 704.
—, die-back of, in U.S.A., 615.
—, *Ganoderma lucidum* on, in Kenya, 9.
—, *Gloeodes pomigena* on, in England, 488.
—, *Gloeosporium perennans* can infect, 299.
— gummosis in Egypt, 749; in Germany, 180.
—, leaf scorch of, in U.S.A., 615.
—, little leaf of, in U.S.A., 99, 434.
—, *Monilia* on, see *Sclerotinia* on.
—, *Mycoderma* on dried fruits of, in U.S.A., 379.
—, *Neofabraea malicorticis* can infect, 299.
—, *Polystigma rubrum* on, in Switzerland, 314.
— pox (virus) (?) in Australia, 230; in Bulgaria, 229; (?) in Holland, (?) S. Africa, and (?) U.S.A., 230; *Lecanium corni* in relation to, 230.
—, *Pseudomonas cerasi* on, in U.S.A., 455; variant of, resembling *P. prunicola*, 455.
—, — *mors-prunorum* on, in England, 227.
—, *Puccinia pruni-spinosae* on, in Switzerland, 451.
—, *Pullularia pullulans* on, in Austria, 575; in U.S.A., 180.
—, *Sclerotinia* on, effect of carbon dioxide on, 102.
—, — *cinerea* on, in England, 99, 488.
—, sooty mould of, in Austria, *Eulecanium corni* in relation to, 575.
—, souring of dried fruits of, in U.S.A., 379.
—, *Stemphylium* on, in Austria, 575.
—, *Stereum purpureum* on, in England, 36; in S. Australia, 142.
—, *Taphrina pruni* on, in Switzerland, 451.
—, *Torula* on dried fruits of, in U.S.A., 380.
—, *Torulopsis* on, in Austria, 575.
[Plum], *Verticillium albo-atrum* on, note on, 117; occurrence in Belgium, 8, 677; in Germany, 117.
—, — *dahliae* can infect, 76.
—, virus disease of, in Bulgaria, 600; in U.S.A., 205, 454; study on, 454. (See also pox of.)
— wilt in Italy, 769.
—, yeasts on dried, in U.S.A., 379.
'Plume' disease of peach in Italy, attributed to *Thrips*, 229.
Poa, *Pythium butleri* can infect, 450.
— *bulbosa*, *Isaria graminiperda* on, in S. Australia, 141.
— *pratensis*, beneficial effect of *Mucor racemosus* on, 535.
— — and *P. trivialis*, *Claviceps microcephala* in seed of, in Denmark, 294.
Pobieda seed dusting apparatus, 617.
Podocrea deformans renamed *Cytturiella deformans*, 116.
Podosphaera leucotricha on apple, control, 123, 140, 297, 298; factors affecting, 140, 298, 517; nature of resistance to, 517; occurrence in England, 140, 297; in Germany, 123, 298, 517, 746; in Hungary, 517; stock influence on susceptibility to, 298; varietal susceptibility to, 298.
— — on pear in Germany, 746.
— (?) *oxyacanthae* on apple in Tasmania, 28.
— — on *Crataegus cuneata* in China, 396.
Poinciana regia, *Nectria anisophila* on, in Costa Rica, 438.
— —, *Sphaerostilbe repens* on, in Ceylon, 77.
'Pollu' of pepper in India, 267.
'Polvillo' disease of sugar-cane in the Argentine, 463.
Polygonum auberti, *Ustilago raciborskiana* on, in Poland, 550.
— *chinense*, *Liroa emodensis* on, in Java, 726; *Farysia emodensis* and *Ustilago treubii* synonyms of, 726.
— *lapathifolium*, *Chlorochytrium rubrum* on, in Sweden, 397.
— —, *P. pennsylvanicum*, and *P. persicaria*, *Ustilago utriculosa* on, in Canada, 277.
Polymyxa graminis on wheat in Canada, 358.
Polyopeus in air of apple orchards in England, 32.
Polyporaceae on orange in Tunis, 302.
—, resupinate, in U.S.A., cultural characters in identification of, 543.
Polyporus adustus, decomposition of wood by, 343.
— *anceps*, hyphal pegs in, 341.
— *borealis* on pine and spruce in Germany, 739.
— *dryadeus* on oak in France, 795.
— *hispidus*, cystidia of, 341.
— *ostreiformis* on areca palm in India, 551.
— *squamosus* can infect beech and lime trees, 44.
— *sulphureus* on oak in France, 795.
— *undatus* on timber in Czecho-Slovakia,

410; renamed *Leptoporus undatus*, 410; synonymy of, 410.
Polystictus abietinus, decomposition of wood by, 343.
— *benzoinus*, hydrogen-ion concentration in relation to, 543.
— *hirsutus* on timber, action of, 740.
— *versicolor* on timber, factors affecting, 411.
— *zonatus*, hydrogen-ion concentration in relation to, 543.
Polystigma rubrum on plum in Switzerland, 314.
Pomegranate (*Punica granatum*), *Ceuthospora* (?) *phyllosticta* and *Coniella granati* on, in Cyprus, 747.
—, *Melanconium fructicolum* on, in Ceylon, 77.
—, *Zythia versoniana* on, in China and Italy, 641; *Nectriella versoniana* perfect stage of, 642.
Pomelo, see Grapefruit.
Pomodust, use of, against *Diaporthe umbrina* and *Diplocarpon rosae* on rose, 696.
Pomogreen, use of, against *Diaporthe umbrina* and *Diplocarpon rosae* on rose, 25.
Poplar (*Populus*), canker of, in France, 127.
—, *Chondroplea populea* on, conidial formation in, 790; *Cystosporella populi* and *Dothiorella populea* synonyms of, 790; *Dothichiza populea* renamed, 790.
—, *Cytospora chrysosperma* on, in Belgium, 677.
—, *Diaporthe* on, in Belgium, 677.
—, die-back of, in Italy, 62.
—, *Dothichiza populea* on, legislation against, in Germany, 800; occurrence in France, 127; in Germany, 800; renamed *Chondroplea populea* (q.v.), 790.
—, *Nectria* on, in U.S.A., 404.
—, — *coccinea* var. *sanguinella* on, and legislation against, in Germany, 399, 800.
—, — *galligena* on, in Belgium, 677.
—, *Septoria* on, in Canada, 123.
—, (?) *Tuberculina* on, in Italy, 63.
—, *Valsa nivea* on, in U.S.A., 270.
—, — *sordida* on, see *Cytospora chrysosperma* on.
Populus deltoides, see Cottonwood.
Poria betulina, diagnosis of, from cultural characters, 543.
(?) — *hypolateritia* on coffee in India, 285.
— *prunicola* and *P. punctata*, diagnosis of, from cultural characters, 543.
— *undata* synonym of *Polyporus undatus*, 410.
— *vaporaria* on timber in Russia, 258; identification of mycelium of, 259; specific resistance to, 481.
Porzol, composition of, 306.
Potash deficiency in cucumber in U.S.A., 663.
— — in relation to die-back of plum in U.S.A., 615; to 'kalimati' disease of sugar-cane in Java, 425; to leaf scorch of currants and gooseberries in Austria, 302; of plum in U.S.A., 615; to rougeau of vine in France, 675.
[Potash deficiency] in tomatoes in Jersey, 549; in U.S.A., 663.
— excess as a cause of leaf discoloration of vine in Germany, 353.
—, see also Fertilizers.
Potassic alum, use of, against wood-staining fungi, 669.
Potassium bichromate a constituent of chrompik, 617.
— chloride, effects of injections of, on resistance of apples to *Diaporthe perniciosa*, 33; toxic effects of, on plants, 781.
— hydroxide and resin, use of, against *Pseudoperonospora cubensis* on cucumber, 493.
— iodide, use of, against *Penicillium crustaceum* on man, 631.
— — and mercuric chloride, use of, against *Corticium solani* on potato, 391, 613.
— — and mercuric iodide, use of, against (?) *Monilia sitophila* on lily, 270.
— malate, effect of injections of, on resistance of apples to *Diaporthe perniciosa*, 33.
— nitrate and mercuric chloride, use of, against *Corticium solani* on cucumber, 710.
— permanganate, use of, against *Sclerotinia americana* on peach, 145.
— resin polysulphide, injury caused by, 97.
— thiobenzoate and potassium β-thionaphthoate, toxicity of, to fungi, 304.
Potato (*Solanum tuberosum*), *Actinomyces* on, see *A. scabies* on.
—, — *clavifer* and *A. flavus* on, in Italy, 783.
—, — *scabies* on, control, 189, 239, 320, 321, 389, 462, 589, 651, 652, 785; factors affecting, 189, 320, 389, 651, 652, 717, 783, 785; legislation against, in Portugal, 127; note on, 652; occurrence in Canada, 462; in Denmark, 715; in Germany, 239, 266, 321, 589, 651, 653; in Italy, 320, 783; in Norway, 189; in Portugal, 127; in U.S.A., 389, 651, 652, 717; studies on, 462, 783; varietal susceptibility to, 189, 266, 320, 321, 589, 716.
—, *Alternaria solani* on, control, 495, 654; occurrence in India, 76; in U.S.A., 495, 654; varietal susceptibility to, 76.
—, aucuba mosaic of, identity of European and American forms of, 48; occurrence in Belgium, 585; in Poland, 716; relation of, to tobacco ring spot, 472.
—, *Bacillus phytophthorus* on, control, 719; effect of, on metabolism and temperature, 320; occurrence in Denmark, 715; in Germany, 266, 320, 719; in New S. Wales, 320; in U.S.A., 651; study on, 320; varietal susceptibility to, 716.
—, *Bacterium solanacearum* can infect,

488; occurrence in Ceylon, 77; in Java, 425; varietal resistance to, 793.
[Potato], *Botrytis cinerea* on, in U.S.A., 612.
— calico in U.S.A., 615; insect transmission of, to chilli, eggplant, and tomato, 615.
—, *Colletotrichum atramentarium* on, in Belgium, 676.
—, *Corticium solani* on, antagonism of bacteria to, 109; control, 110, 389, 391, 530, 613, 651, 652, 719, 785; factors affecting, 159, 187, 785; hyphal fusions in, 331; notes on, 159, 186, 676; occurrence in Austria, 186; in Belgium, 676; in Canada, 530; in Denmark, 715; in Germany, 331, 719; in S. Australia, 159; in U.S.A., 133, 389, 391, 613, 651, 652; in Victoria, 110; study on, 530; varietal susceptibility to, 716.
— crinkle in Ireland, 717; in Poland, 716; relation of, to American potato mild mosaic, 48; to potato mosaic, 717; to virus A, 717; transmission of, by *Myzus persicae*, 717; varietal susceptibility to, 716.
— — A, relation of, to 'healthy potato virus' and tobacco veinbanding, 588.
— curly dwarf, recent work on, 187.
— degeneration, dehydration capacity of tubers in relation to, 239; ecological factors affecting, 461; electrometric diagnosis of, 531; etiology of, 587, 716, 783; melanin formation in relation to, 531; note on, 238; occurrence in France, 75; in Germany, 238, 239, 461, 531; in Switzerland, 783; recent work on, 716. (See also virus diseases of.)
—, (?) *Didymella lycopersici* on, in Jersey, 549.
—, 'Eisenfleckigkeit' of, see spraing of.
—, flaking of the tubers of, in Italy, attributed to a virus, 321.
—, *Fusarium* on, in Austria, 187; in Cyprus, 323.
—, — *coeruleum* on, specialization of, 184.
—, — *oxysporum* on, metabolism of, 531; occurrence in England, 241; in Greece, 469; studies on, 241, 531; *F. euoxysporum* synonym of, 241; toxic action of, 531.
—, — *solani* can infect, 136.
—, giant hill of, in U.S.A., 48.
—, 'healthy potato virus' of, in Holland, 318, 589; in U.S.A., 48, 79, 205, 388, 588, 612; properties of virus of, 205, 319, 588; reaction of true seedlings to, 79; of various plants to, 318; relation of, to potato mosaic, 48, 588; to potato crinkle A, 588; to tomato streak, 79; study on, 318; transmission of, by sap, 588; types of, 388; varietal reaction to, 388.
— heart necrosis in Italy, 784.
—, internal rust spot of, see Spraing.
—, latent mosaic of, and latent virus of, see 'healthy potato virus'.
[Potato] leaf roll, effect of, on carbohydrate metabolism, 48; on growth, 237; on nitrogen metabolism, 388; on physiology of host, 238; on yield, 49, 237; factors affecting, 236; identity of European and American forms of, 48; notes on, 585; occurrence in Belgium, 585; in Denmark, 715; in Europe, 48, 587; in France, 491; in Germany, 238, 587; in Poland, 716; in Scotland, 48, 388; in U.S.A., 48, 188, 237, 612; physiological theories of, not accepted, 587; recent work on, 187; studies on, 48, 237, 238, 388; transmission of, 612; by grafts, 587; by *Myzus persicae*, 48, 587; varietal susceptibility to, 715, 716.
—, magnesium deficiency disease of, in U.S.A., 654.
—, melanin formation in, 531.
—, 'moron' disease of, in U.S.A., 188.
— mosaic, effect of, on catalase activity of host, 778; on yield, 612; factors affecting, 49; filtration of viruses X and Y of, 42; *Hyoscyamus niger* as a differential host for, 139; identity of European and American forms of interveinal, 48; notes on, 492; occurrence in Belgium, 585; in Denmark, 715; in England, 42; in Europe, 48; in Germany, 586, 587; in Italy, 492; in Poland, 716; in Rumania, 580; in Russia, 778; in Scotland, 139; in U.S.A., 48, 49, 50, 588, 612; properties of viruses of, 42, 731; recent work on, 187; relation of, to 'healthy potato' virus, 48, 588; to potato crinkle, 48, 717; to potato para-crinkle, 48, 648; to potato ring spot, 588; to potato streak, 589, 648; to tobacco veinbanding, 588; to tomato stripe (streak), 731; of virus A to, 587, 648; of viruses H19, R77 to, 587; of X and Y viruses to, 42, 587, 648; separation of X and Y viruses of, 42; studies on, 42, 586, 588; transmission of, by *Myzus persicae*, 587, 648; to *Datura stramonium*, 587; to *Nicotiana glutinosa*, 731; to *N. longiflora* and tobacco, 586; to *Petunia nyctaginiflora*, 587; tuber indexing against, 49, 50; types of, 48, 49, 50, 585, 586, 588, 612, 648; varietal susceptibility to, 588, 715.
— mottle virus of, see 'healthy potato virus' of.
— mottling in Belgium, 585.
—, necrotic virus disease of, in U.S.A., 388; transmission of, to *Datura stramonium*, tobacco, and tomato, 388.
— para-crinkle, note on, 648; relation of American leaf rolling mosaic to European, 48.
—, *Phomopsis tuberivora* on, in Canada, 241.
—, *Phytophthora erythroseptica* on, specialization of, 184.
—. — *infestans* on, breeding against, 190, 390; control, 76, 110, 240, 390, 391, 421, 491, 496, 613, 654, 715, 718, 774; on seed tubers, 549; factors affecting,

141, 490, 491 ; losses caused by, 110, 266, 491, 618 ; notes on, 75, 249 ; occurrence in Austria, 187 ; in the Channel Islands, 110, 549 ; in Denmark, 715 ; in England, 141, 774 ; in France, 75, 76, 490, 491 ; in Germany, 266, 465, 653, 718 ; in India, 420 ; in Réunion, 680 ; in U.S.A., 121, 190, 240, 390, 391, 490, 496, 613, 654 ; in Wales, 236 ; physiologic forms of, 390, 465 ; spray warnings against, in France, 76 ; in U.S.A., 241, 613 ; studies on, 240, 390, 465 ; varietal resistance to, 187, 613, 715.

[Potato, *Phytophthora*] *megasperma* on, in Northern Ireland, 466.

—, pseudo-net necrosis of, in Italy, 319 ; relation of, to hereditary 'Eisenfleckigkeit', 319 ; transmission of, by *Myzus persicae*, 319.

—, psyllid yellows of, in U.S.A., 424, 461 ; *Paratrioza cockerelli* in relation to, 424, 461 ; recent work on, 187.

—, *Pythium* (?) *de Baryanum* on, specialization of, 184.

—, *Rhizoctonia* on, in Cyprus, 328.

—, ring spot of, in U.S.A., 588 ; relation of, to potato rugose mosaic, 588 ; separation of, from 'healthy potato virus', 588. (See also tobacco ring spot affecting.)

— seed certification in Belgium, 585 ; in Canada, 188 ; in Holland, 188 ; in U.S.A., 50, 188, 496.

— spindle tuber in U.S.A., 48 ; recent work on, 187.

—, *Spongospora subterranea* on, control, 239 ; factors affecting, 239 ; legislation against, in Bulgaria, 592 ; in Russia, 589 ; occurrence in the Caucasus, 589 ; in Germany, 239 ; varietal susceptibility to, 239.

—, spraing of, etiology of, 239, 319, 321, 392, 653 ; factors affecting, 239, 321, 392, 652 ; hereditary type of, 319 ; occurrence in Germany, 239, 321, 391, 652, 653 ; in Switzerland, 653 ; studies on, 391, 652 ; transmission of, through seed tubers, 319, 392 ; varietal susceptibility to, 239, 391, 653.

—, *Stemphylium solani* can infect, 60.

— streak, comparison of American and European forms of, 48 ; note on, 648 ; occurrence in Belgium, 585 ; in Poland, 716 ; in U.S.A., 48 ; relation of, to potato rugose mosaic, 589 ; types of, 48.

—, *Synchytrium endobioticum* on, biochemistry of, 718 ; control, 187, 190, 322, 651, 672 ; factors affecting, 50, 490, 651 ; germination of sporangia of, 322 ; legislation against, in Bulgaria, 592 ; in Great Britain, 800 ; in Poland, 591 ; in Portugal, 127, 672 ; in S. Rhodesia, 464 ; in Switzerland, 190 ; note on, 75 ; occurrence in Austria, 51, 187 ; in Belgium, 51 ; in Czecho-Slovakia, 51, 322 ; in Finland, 51 ; in France, 51, 75, 490 ; in Germany, 51, 322, 578, 651 ; in Great Britain, Holland, Ireland, N. America, and Norway, 51 ; in Poland, 51, 591, 718 ; in Portugal, 127, 672 ; in S. Africa, 51 ; in Sweden, 51 ; in Switzerland, 51, 189, 678 ; in U.S.A., 51 ; studies on, 50, 322, 718 ; transmission of, 189 ; varietal resistance to, 51, 75, 190, 322, 490, 678.

[Potato], 'tambera' disease of, in India similar to symptoms caused by mites in U.S.A., 784.

—, tobacco mosaic can infect, 119.

—, — ring spot affecting, in U.S.A., 472. (See also Potato ring spot.)

—, — veinbanding virus affecting, in Holland, 589 ; in U.S.A., 205, 588 ; transmission of, by *Macrosiphum gei* and *Myzus persicae*, 588 ; relation of, to potato rugose mosaic, 588 ; viability of, 205.

—, tomato spotted wilt can infect, 59.

—, *Verticillium* on, in Austria, 187.

—, — *albo-atrum* can infect, 470 ; occurrence in New Zealand, 408, 719 ; study on, 719.

—, — — var. *caespitosum* on, in Germany, 117.

— virus A, 586, 648, 717 ; relation of, to potato crinkle, 717 ; to tobacco veinbanding, 717 ; to virus Y, 717 ; transmission of, by *Myzus persicae*, 717 ; by *M. circumflexus*, 717.

— — H19, 586.

— — R77, 586.

— — X, 42, 582, 587, 648 ; G and L types of, on tobacco, 581 ; protective inoculations against, 582.

— — Y, 42, 582, 586, 648, 717 ; relation of, to potato crinkle, 717 ; to potato leaf-drop streak, 717 ; to tobacco veinbanding, 717 ; transmission of, by *Myzus persicae*, 648.

— — diseases, comparative study of American and European, 47 ; control, 7, 49, 50, 188, 236, 496, 615, 677 ; degeneration attributed to, 783 ; effect of, on yield, 716 ; notes on a new, 388 ; occurrence in Belgium, 585 ; in Ireland, 7 ; (?) in Italy, 321 ; in Poland, 716 ; in Switzerland, 677, 783 ; in U.S.A., 188, 388, 496, 612, 615 ; in Wales, 236 ; production of seed free from, 7, 49, 50, 236, 677 ; tests of certified seed against, 585 ; transmission of, by *Macrosiphum gei*, 612 ; by *Myzus persicae*, 236 ; tuber indexing and uniting against, 49, 50, 615 ; varietal resistance to, 716. (See also degeneration of.)

—, — -like disease of, in U.S.A., attributed to *Tarsonemus*, 784.

—, 'wilding' (= witches' broom) of, in Scotland, 48.

—, yellow dwarf of, in U.S.A., 48, 187.

— — top in U.S.A., 48.

Potentilla tormentilla, mycorrhiza of, in Italy, 309.

Pox of plum, see Virus disease of.

Praktikus seed disinfection apparatus, 430.

Primula, beet curly top virus can infect, 447.
— *obconica*, *Thielaviopsis basicola* on, in Holland, 513.
Privet (*Ligustrum vulgare*), *Macrophyllosticta ligustri* on, in Portugal, 726.
Proactinomyces in soil in Europe, 324; formerly placed in *Mycobacterium*, 324.
— *corallinus* in soil in Australia, 324.
Promecotheca cumingii, control of, by *Beauveria globulifera* in the Philippines, 217.
Propionaldehyde, effect of, on growth of *Trichoderma lignorum*, 46.
— not accepted as the toxic principle of *Fusarium lycopersici* and *F. vasinfectum*, 315.
Protocatechuic acid in relation to resistance of onion to *Colletotrichum circinans*, 672.
Protomyces inundatus on celery in Sweden, 330.
Protonemura humeralis, *Orphella coronata* on, in Alpine waters, 512.
Protoplasmic continuity in fungi, 776.
Prune, see Plum.
Prunus amygdalus, see Almond.
— *armeniaca*, see Apricot.
— *avium* and *P. cerasus*, see Cherry.
— *domestica*, see Plum.
— *laurocerasus*, (?) bacterial disease of, and *Heterosporium* on, in Switzerland, 97.
— *pennsylvanica*, *Dibotryon morbosum* on, in Canada, 704.
— *persica*, see Peach.
— *serotina*, *Nectria* on, in U.S.A., 404.
— —, *Tryblidiella* (?) *rufula* on, in U.S.A., 791; *Diplodia* stage of, 791.
Psalliota arvensis and *P. campestris*, see Mushrooms.
Pseudobalsamia microspora in mushroom beds in U.S.A., 352.
Pseudo-black chaff of wheat in Canada, 561.
Pseudococcidioides mazzai synonym of *Coccidioides immitis*, 440.
Pseudococcus brevipes, rôle of, in pineapple leaf spotting, in Hawaii, 521; transmitting pineapple wilt in Hawaii, 520.
Pseudo-leaf scald of sugar-cane, chlorotic streak and fourth disease identical with, 723. (See also Fourth disease of.)
Pseudomicrocera henningsii on *Aulacaspis pentagona* and *Ischnaspis filiformis* in the Seychelles, 144.
Pseudomonas barkeri may be a synonym of *P. syringae*, 376.
— *campestris*, antagonism of, to fungi, 109.
— — on cabbage in Sumatra, 425.
— — on crucifers in Japan, 554; in U.S.A., 546.
— —, variation in, 81.
— *cerasi* may be a synonym of *P. syringae*, 376.
— — on plum in U.S.A., 455; variant of, resembling *P. prunicola*, 455.
— *citri* on citrus, bacteriophage of, 551; control, 77, 433; factors affecting, 433; legislation against, in Italy, 565; in S. Rhodesia, 463; occurrence in Ceylon, 77, 433; in India, 551; in Japan, 554; in U.S.A., 433; varietal resistance to, 433.
[*Pseudomonas citri*] on grapefruit in Ceylon, 433.
— — on lemon in Ceylon, 77.
— — on orange in Ceylon, 77, 433.
— *citriputeale* on lemon in Sicily, 281.
— — synonym of *P. syringae*, 376.
— *hyacinthi* on hyacinth, legislation against, in Germany, 514; study on, 514.
— *hypertrophicans* on *Eugenia latifolia* in Surinam, 435.
— *lignicola* on elm in Switzerland, 194.
— *mors-prunorum* on plum in England, 227.
— *nectarophila* and *P. papulans* may be synonyms of *P. syringae*, 376.
— *pisi* on peas in France, 489; in U.S.A., 412.
— *prunicola* synonym of *P. syringae*, 376.
— —, variant of *P. cerasi* resembling, 455.
— *saliciperda* on *Salix alba*, *S. amygdalina*, and *S. purpurea* in Holland, 60; *Cryptorrhynchus lapathi* as vector of, 61; difference between *Bacterium salicis* and, 61.
— *savastanoi* on olive, control, 458, 522; factors affecting, 521; legislation against, in the Argentine, 736; occurrence in Italy, 521; in U.S.A., 458; studies on, 458, 521.
— *syringae* on apple in U.S.A., 376.
(?) — — on lilac in England, 26.
— — on orange in Tunis, 302.
— — on pear in U.S.A., 376.
— —, synonymy of, 376.
— *tolaasii* on mushrooms in England, 72; in U.S.A., 352.
— *tritici* on wheat in Egypt, 749.
— *uliformica* may be a synonym of *P. syringae*, 376.
Pseudo-net necrosis of potato in Italy, 319; relation of, to hereditary 'Eisenfleckigkeit', 319; transmission of, by *Myzus persicae*, 319.
Pseudoperonospora cubensis on cucumber, control, 5, 493; epidemiology of, 5; factors affecting, 5; occurrence in Germany, 578; in U.S.A., 5, 493; study on, 5.
— — on melon, note on, 5; occurrence in U.S.A., 358.
— *humuli* on hops, breeding against, 326; control, 111, 242, 325, 326, 354, 722, 774; factors affecting, 326; germination of the oospores of, 656; incubation period of, 111; legislation against, in Australia, 386; in Norway, 528; notes on, 111, 112, 354, 656; occurrence in Canada, 111, 325; in Czecho-Slovakia, 326; in England, 111, 354, 774; in France, 111; in Germany, 242, 578, 722; in U.S. 111, 325, 656; seedling infection

111, 325; studies on, 325, 656; varietal susceptibility to, 111.
Pseudopeziza medicaginis on lucerne in U.S.A., 177.
— *ribis* on currants, breeding against, 519; control, 773; factors affecting, 302; occurrence in Austria, 302; in Germany, 519, 773; in Holland, 705; varietal susceptibility to, 773.
— — on gooseberry, control, 573, 640, 773; factors affecting, 302; occurrence in Austria, 302; in Denmark, 640; in Germany, 773; in U.S.A., 573.
— *tracheiphila* on vine in Switzerland, 314.
Pseudopythium phytophthoron synonym of *Phytophthora cinnamomi*, 106.
Pseudo-streak of sugar-cane identical with chlorotic streak, 245. (See also Fourth disease of.)
Pseudotsuga taxifolia, *Allantophoma endogenospora*, *A. exogenospora*, and *A. nematospora* on, in Germany, 789.
— —, *Blastophoma* (?) *douglasii* on, conidial formation in, 790; *Phoma douglasii* renamed, 790.
— —, *Dasyscypha ellisiana* on, in U.S.A., 733.
— —, *Phomopsis microspora* on, in Germany, 789.
— — *Pythium* on, factors affecting, 405.
— — *Rhabdocline pseudotsugae* on, control, , 67, 406; legislation against, in Germany (proposed), 66; notes on, 66; occurrence in America, 67; in Germany, 64, 65, 66, 255, 257, 406, 578; in Holland, 63; studies on, 63, 65, 255; varietal resistance to, 64, 65, 66, 255.
— —, *Rhizoctonia* on, factors affecting, 405.
— —, *Trametes pini* on, in Poland, 739.
Psorosis of citrus, control, 89, 494; factors affecting, 89; note on, 142; occurrence in S. Africa, 142; in U.S.A., 89, 494; two types of, 89.
— of orange in Tunis, 302.
Psyllid yellows of potato in U.S.A., 424, 461; recent work on, 187; *Paratrioza cockerelli* in relation to, 424, 461.
— — of tomato in U.S.A., 424; *Paratrioza cockerelli* in relation to, 424.
Pteleobius vittatus transmitting *Ceratostomella ulmi* on elm in Italy, 734.
Pteridium aquilinum, *Corticium anceps* on, in Ireland and Scotland, 132; *Tulasnella anceps* renamed, 132.
— —, disease of, in Scotland, 139.
— —, *Mycosphaerella* on, in Scotland, 132.
Puccinia on barley in Bulgaria, Poland, and Rumania, 150.
— on cereals, assimilatory capacity of leaves in relation to, 383; overwintering of, in Tunis, 271; recent literature on, 208.
— on *Festuca elatior* in Italy, 498.
— on oats, estimation of injury caused by, 752; occurrence in Bulgaria, Poland, and Rumania, 150.
[*Puccinia*] on wheat, chemical composition of spores of, 585; factors affecting, 498; injury caused by, estimation of, 752; losses caused by, 150, 750; occurrence in Bulgaria, 150; in Italy, 498; in Poland and Rumania, 150; in S. Africa, 750; overwintering of, in Italy, 498.
— *aconiti-rubrae*, *P. actaeae-agropyri*, *P. a.-elymi*, *P. agrostidis*, and *P. alternans* forms of *P. rubigo-vera*, 499.
— *anomala* can infect *Avena nigra*, *A. strigosa*, *Hordeum bulbosum*, and *H. maritimum*, 274.
— — on barley, genetics of resistance to, 78; grass hosts of, 274; occurrence in Germany, 149, 273; in U.S.A., 78; physiologic forms of, 78, 274; varietal resistance to, 78.
— *antirrhini* on *Antirrhinum majus* in Great Britain, 764.
— *arachidis* on groundnut in Porto Rico, 246; *Uromyces arachidis* synonym of, 246.
— *arrhenatheri* on barberry, differentiation of *P. graminis* and *P. pygmaea* from, 536.
— *asparagi* on asparagus, legislation against, in Germany, 336; occurrence in Germany, 336, 745.
— *boroniae* on *Boronia megastigma* in Victoria, 97.
— *bromina* a form of *P. rubigo-vera*, 499.
— — on *Bromus sterilis* in France, 177.
— *chrysanthemi* on *Chrysanthemum* in Belgium, 677.
— *dietrichiana* a form of *P. rubigo-vera* 499.
— *fagopyri* on buckwheat in China, 248.
— *gladioli* on *Gladiolus illyricus* var. *reuteri* in Morocco, 469.
— *glumarum* can infect *Agropyron repens*, *Bromus arvensis*, *B. inermis*, *Elymus*, *Gaudinia fragilis*, *Hordeum jubatum*, *H. maritimum*, and rye, 273.
— — on barley in Germany, 149.
— — on *Dactylis glomerata* in France, 177.
— — on grasses, transmission of, from wheat, 273.
— — on *Hordeum jubatum* in Canada, 83.
— — on wheat, breeding against, 13, 208, 360; control by fungicides, 151, 271; differential varieties for forms of, 272; effect of bunt infection on susceptibility to, 276; epidemiology of, 83; factors affecting, 84, 150, 490, 556; fat formation in cells induced by, 317; genetics of resistance to, 209, 360; germination of uredospores of, 556; grass hosts of, 273; mutation in, 273; occurrence in the Argentine, 683; in Canada, 83; in Czecho-Slovakia, 360; in France, 75, 150, 275, 276, 489; in Germany, 149, 208, 272, 273, 556, 557; in Hungary, 359; in Jugo-Slavia, 359; in Kenya, 13; in Rumania, 549; in Tunis, 151, 271; in U.S.A., 84; overwintering of, 489; physiologic forms of, 272, 273, 557; reaction towards, as a differential

character, 558; studies on, 83, 150, 208, 272, 360, 556, 557; variation in resistance to, 150; varietal resistance to, 150, 209, 272, 275, 360, 557.
[*Puccinia*] *graminis* can infect *Agropyron repens, Bromus, Gaudinia fragilis, Hordeum bulbosum, H. maritimum,* and *H. secalinum*, 274.
— —, heterothallism in, 362.
— — on *Agropyron smithii* in U.S.A., 556.
— — on *Agrostis*, hybridization of, with *P. g. tritici*, 208.
— — on barberry, aecidiospore discharge of, 15; differentiation of, from *P. arrhenatheri* and *P. pygmaea*, 536; factors affecting, 15; fertilization in, 318; hybridization of, 86; legislation against, in Esthonia, 800; in Germany, 736; in Latvia, 672; in U.S.A., 400; notes on, 7, 294, 556; occurrence in Germany, 736; in Irish Free State, 7; in Italy, 497; in Latvia, 672; in Sweden, 294; in U.S.A., 15, 86, 400, 556; physiologic forms of, 15, 86; specific and varietal susceptibility to, 7, 15, 294, 400.
— — on barley, genetics of resistance to, 753; occurrence in Germany, 149; in U.S.A., 753; physiologic forms of, 753; transmitted from wheat, 274, 753.
— — on cereals, barberry eradication against, 203, 400, 427, 672, 736, 800; estimation of losses caused by, 426; occurrence in the Balkans, 359; in Canada, 426; in Esthonia, 800.
— — on grasses, transmission from wheat, 274.
— — on *Hordeum jubatum, H. pusillum,* and *Hystrix patula* in U.S.A., 556.
— — on oats, control by dusting, 504; effect of, on yield, 504; genetics of resistance to, 269, 281; occurrence in Canada, 280, 504; in Germany, 149; in Irish Free State, 7; in U.S.A., 68, 269; overwintering of, 7; physiologic forms of, 86, 280; studies on, 86, 280, 504; varietal resistance to, 86, 269.
— — on rye, factors affecting, 87; hybridization of, with *P. g. tritici*, 87, 208; mutation in, 87; note on, 15; occurrence in France, 87; in Germany, 149; in Scotland, 87; in U.S.A., 87; physiological forms of, 87; rate of fall of spores of, 498; study on, 87; transmitted from wheat, 274.
— — on wheat, breeding against, 17; causing asthma in man, 174; control, 208, 271, 359, 427, 681; by dusting, 271; effect of amputation of roots on susceptibility to, 501; of, on yield, 149, 361; of sowing date on, 490, 681; epidemiology of, 359, 360, 427, 550, 556, 681; factors affecting, 14, 15, 75, 359, 497, 498, 681, 750; genetics of resistance to, 13, 14, 750; germination of teleutospores of, 497; grass hosts of, 274; hybridization of, with *P. g. agrostidis*, 208; with *P. g. secalis*, 87, 208; losses caused by, 203, 359, 426, 681; notes on, 492; occurrence in the Argentine, 683; in the Balkans, 359; in Bulgaria, 359, 681; in Canada, 14, 174, 208, 750; in France, 75, 275, 489; in Germany, 149, 273, 359; in Hungary, 359; in Italy, 492, 497, 498; in Jugo-Slavia, 359; in Kenya, 9, 13; in Macedonia, 359; in New S. Wales, 361; in New Zealand, 496; in Poland, 359, 550; in Queensland, 271; in Rumania, 359, 426, 549; in S. Australia, 619; in Tunis, 271; in Turkey, 359; in U.S.A., 14, 17, 87, 203, 360, 427, 556; overwintering of, in Italy, 497; phenology of, 359, 360, 497; physiologic forms of, 9, 13, 14, 208, 273, 427, 556, 750; rate of fall of spores of, 498; reaction of seedlings to, in greenhouse and field, 750; studies on, 14, 208, 360, 427, 497, 556, 750; varietal resistance to, 9, 17, 271, 275, 361, 426, 490, 497, 619, 681, 750; viability of teleutospores of, 15.
[*Puccinia*] *granularis* on begonia in S. Africa, 448.
— *helianthi*, fertilization in, 235, 318.
— — on sunflower in Russia, 571.
— *hordeina* on barley in Siberia, 307.
— *impatientis* a form of *P. rubigo-vera*, 499.
— *lolii* can infect *Aegilops cylindrica, Arrhenatherum elatius, Avena fatua, Cynosurus cristatus, Dactylis glomerata, Gaudinia fragilis*, grasses, *Hordeum maritimum*, oats, and *Phleum pratense*, 274.
— —, differentiation of four varieties of, 264.
— —, heterothallism in, 164, 362.
— — on *Avena fatua* in Canada, 364.
— — on *Bromus ciliatus, B. latiglumis, B. porteri, Calamagrostis*, and *C. elongata* in Canada, 364.
— — on cereals in Esthonia, 800; eradication of *Rhamnus cathartica* against, in Esthonia, 800.
— — on *Elaeagnus commutata* in Canada, 364.
— — on grasses in France, 177.
— — on *Lepargyraea canadensis* in Canada, 364.
— — on *Lolium perenne* in France, 177.
— — on oats, breeding against, 269; control by dusting, 272, 504; effect of, on yield, 504; of smut infection on, 211; host range of, 274, 364; occurrence in Canada, 211, 268, 364, 504; in Germany, 150, 273; in Mexico, 268; in Tunis, 272; in U.S.A., 268; rate of fall of spores of, 498; physiologic forms of, 268, 274, 364; varietal resistance to, 269; varieties of, 364.
— — on *Rhamnus alnifolia* in Canada, 364.
— — on *Rhamnus cathartica*, legislation against, in Esthonia, 800; in Latvia, 672; occurrence in Canada, 364.
— — on *Scolochloa festucacea* in Canada, 364.
— *malvacearum* on hollyhock in U.S.A., cytology of, 782.

[*Puccinia*] *maydis* on maize in Réunion, 680.
— — on *Oxalis stricta* in U.S.A., cytology of, 388.
— *mirabilissima* on barberry in Germany, 375, 578; in Sweden, 293, 330; revised diagnosis of, 330; study on, 293.
— *obliterata*, *P. perplexans*, and *P. persistens* regarded as forms of *P. rubigo-vera*, 499.
— *pringsheimiana* on gooseberry in Denmark, 640. (See also *P. ribesii-caricis*.)
— *procera* a form of *P. rubigo-vera*, 499.
— *pruni-persicae* on peach in China, 248.
— *pruni-spinosae* on *Anemone ranunculoides* in Switzerland, 713.
— — on peach in Réunion, 680.
— — on plum in Switzerland, 451.
— *pygmaea* on barberry in Russia, 536; differentiation of *P. graminis* from, 536.
— — on *Calamagrostis* in Russia, 536.
— *ribesii-caricis* on gooseberry and *Ribes* in Germany, 381. (See also *P. pringsheimiana*.)
— *rubigo-vera*, host range of, 499.
— —, *P. aconiti-rubrae*, *P. actaeae-agropyri*, *P. actaeae-elymi*, *P. agrostidis*, *P. alternans*, *P. bromina*, *P. dietrichiana*, *P. impatientis*, *P. obliterata*, *P. perplexans*, *P. persistens*, *P. procera*, *P. secalina*, *P. symphyti-brorum*, and *P. triticina* regarded as forms of, 499.
— *secalina* a form of *P. rubigo-vera*, 499.
— — can infect *Bromus sterilis*, *Hordeum*, and *H. maritimum*, 274.
— — on rye, grass hosts of, 274; occurrence in Germany, 149, 273; in U.S.A., 28; varietal resistance to, 78.
— *symphyti-bromorum* a form of *P. rubigo-vera*, 499.
— *triticina* a form of *P. rubigo-vera*, 499.
— — can infect *Aegilops*, *Agropyron*, *Avena nuda*, barley, *Elymus*, *Gaudinia fragilis*, *Hordeum bulbosum*, *H. maritimum*, and rye, 274.
— — on wheat, breeding against, 13, 78; control, 681; by fungicides, 151, 271; effect of date of sowing on, 490, 681; of, on growth, 427; on physiology of host, 427, 681; on yield, 359, 361; factors affecting, 206, 274, 490, 681; genetics of resistance to, 208; grass hosts of, 273; losses caused by, 681; occurrence in the Argentine, 683; in Austria, 16; in Bulgaria, 359, 681; in Finland, 619; in France, 75, 150, 489; in Germany, 15, 149, 208, 273, 274, 619; in Greece, 619; in Hungary, 359; in Italy, 497; in Kenya, 13; in New S. Wales, 361; in New Zealand, 496; in Queensland, 271; in Rumania, 426, 549, 619; in Sweden, 619; in Tunis, 151, 271; in U.S.A., 78, 151, 206; osmotic force of spores of, 15; phenology of, 497, 681; physiologic forms of, 13, 15, 78, 151, 273, 426, 549, 619; rate of fall of spores of, 498; studies on, 15, 151, 274, 361, 497; variation in resistance to, 150; varietal resistance to, 13, 75, 78, 206, 271, 361, 426, 427, 681; viability of uredospores of, 16.
[*Puccinia*] *violae* on *Viola cucullata* in U.S.A., cytology of, 388.
Pucciniastrum americanum on raspberry in U.S.A., 104.
— *castaneae* on chestnut in Japan, 726.
— *coryli* on *Corylus rostrata* var. *sieboldiana* in Japan, 726.
Puffing of orange in Italy, 746.
Pullularia pullulans on pine in Germany, 605.
— — on plum in Austria, 575; in U.S.A., 180.
Pulpwood, see Timber.
Pulvinaria, *Hypocrella reineckiana* on, in Sierra Leone, 553.
Pumpkin, see Vegetable marrow.
Punica granatum, see Pomegranate.
Puntatura of wheat, similarity of, to black germ of, in Siberia, 160.
Pyracantha coccinea, *Venturia crataegi* on, in U.S.A., 205.
Pyrenochaeta can infect lime trees, 44.
Pyrenopeziza medicaginis on lucerne in U.S.A., 177.
Pyronema confluens, protoplasmic streaming in, 777.
Pyrus (?) *americana*, *Bacillus amylovorus* on, in Canada, 452.
— *aucuparia*, *Gloeosporium perennans* and *Neofabraea malicorticis* can infect, 299.
— —, *Tylophoma sorbi* on, conidial formation in, 790; *Dothiora sorbi* renamed, 790.
— *calleryana*, resistance of, to *Bacillus amylovorus*, 11.
— *communis*, see Pear.
— — × *P. serotina*, see Pineapple pear.
— *coronaria*, *Gloeodes pomigena* on, in U.S.A., 298.
— *malus*, see Apple.
— *rivularis*, *Gloeosporium perennans* can infect, 299.
— —, *Neofabraea malicorticis* on, in U.S.A., 299.
— (?) *serotina*, *Alternaria bokurai* on, in Manchuria, 769.
— —, — *kikuchiana* on, in Japan, 768.
— — and pear hybrid, see Pineapple pear.
Pythium on avocado pear in the Philippines, 383.
— on bean in U.S.A., 679.
— on chestnut in Italy, 746.
— on citrus in U.S.A., 192.
— on *Gloxinia* in Germany, 97.
— on *Hevea* rubber in Malaya, 507.
— on *Musa textilis* in the Philippines, 383.
(?) — on nematodes in U.S.A., 762.
(?) — on palm in Belgium, 8.
— on pea in U.S.A., 671.
— on pine and *Pseudotsuga taxifolia*, 405.
— on strawberry in France, 489; in U.S.A., 680.
— on tobacco in Sumatra, 471.
—, *Trichoderma lignorum* parasitizing, 192.
— *aphanidermatum* on beet in Austria, 135.

[*Pythium aphanidermatum*] on papaw in Porto Rico, 246.
— — on sisal in Kenya, 9.
— (?) — on sugar-cane in Hawaii, 723.
— *arrhenomanes* on sugar-cane, antagonism of Actinomycetes to, 679.
— *butleri* can infect *Poa*, 450.
— — on *Agrostis stolonifera* in U.S.A., 450.
— — on sweet potato in U.S.A., 671.
— *de Baryanum*, antagonism of bacteria to, 109.
— —, effect of X-rays on thermogenesis in, 186.
— — on beet in Austria, 135; in Czecho-Slovakia, 546; in Germany, 266.
— — on begonia in Germany, 448.
— — on cauliflower in Denmark, 709.
— (?) — on celery in Sweden, 330.
— — on *Lupinus texensis* on U.S.A., 96.
— (?) — on pine in the Philippines, 383.
— (?) — on potato, specialization of, 184.
— — on tobacco, in Porto Rico, 398, 401.
— *epigynum* can infect bean, grasses, maize, and pea, 331.
— — in soil in U.S.A., 331.
— *fabae* (?) in S. Africa, 135.
— — on bean in Australia, 135.
— *graminicolum* on sugar-cane in Porto Rico, 246.
— *mamillatum* can infect *Cladophora* and *Gloeocapsa*, 307.
— *megalacanthum* on flax in Holland, 372.
— *ultimum* on aster (China) in S. Africa, 175.
— — on cabbage, chilli, and eggplant in U.S.A., 232.
— — on spinach in France, 488.
— — on tomato, control, 122, 232, 643; occurrence in U.S.A., 122, 232, 643.

Quercus, see Oak.
Quince (*Cydonia vulgaris*), *Gloeosporium perennans* on, in U.S.A., 299.
—, *Gymnosporangium germinale* on, in U.S.A., 704.
—, *Neofabraea malicorticis* can infect, 299.
—, *Sclerotinia cydoniae* and *Verticillium dahliae* on, in England, 488.

R77 virus of potato, 586.
Radiation, ambient, effect of, on *Bacterium tumefaciens* on *Pelargonium*, 82.
—, see also Light, Ultra-violet rays, X-rays, &c.
Radish (*Raphanus sativus*), *Aphanomyces raphani* on, in Germany, 350; in U.S.A., 546.
—, bacteria on, in Germany, 351.
—, *Bacterium maculicola* on, in Japan, 554.
—, *Cercospora cruciferarum* on, in U.S.A., 546.
—, *Cercosporella albo-maculans* on, in U.S.A., 546.
Ramularia australis on *Ceratonia siliqua* in Italy, 660.
[*Ramularia*] *betae* on beet in Austria, 135; in Rumania, 549.
— *foeniculi* on *Foeniculum vulgare* in Italy, 244.
— *tulasnei* conidial stage of *Mycosphaerella fragariae* (q.v.), 705.
— *vallisumbrosae* on narcissus in Canada, 551.
Ramulispora andropogonis synonym of *Titaeospora andropogonis*, 248.
Rape (*Brassica napus*), *Plasmodiophora brassicae* on, in New Zealand, 412.
Rape cake, decomposition of, in soil in Japan, 593.
Raphanus sativus, see Radish.
Raspberry (*Rubus* spp.), bacterial disease of, in U.S.A., 455.
—, *Bacterium tumefaciens* on, in Holland, 705.
—, *Didymella applanata* on, in Germany, 519; in Holland, 705.
— diseases, control, in U.S.A., 640.
—, *Elsinoe veneta* on, control, 456; occurrence in Great Britain, 771; in Holland, 705; in U.S.A., 456; studies on, 456, 771.
—, fruit blight of, in Canada, 678.
—, *Fusarium* on, in Holland, 705.
—, — *lateritium* on, specialization in, 99.
—, *Gymnoconia interstitialis* on, in U.S.A., 104, 706.
—, *Hendersonia rubi* on, in Holland, 705.
—, *Leptosphaeria coniothyrium* on, in Canada, 678; in Holland, 705.
— mosaic, control, 488, 771; factors affecting, 203, 770; migration of virus of, in tissues, 770; notes on, 204, 205; occurrence in Canada, 678; in England, 488, 771; in Holland, 705; in U.S.A., 203, 204, 770; stock certification against, in Canada, 678; in England, 771; study on, 770; transmission of, by *Amphorophora rubi*, *A. rubicola*, *A. sensoriata*, and (?) *Aphis rubiphila*, 771; types of, 203, 678, 770; varietal susceptibility to, 203, 488.
—, *Mycosphaerella rubi* on, in Kenya, 9.
—, *Phragmidium imitans* on, in Canada, 678.
—, *Plectodiscella veneta* on, see *Elsinoe veneta* on.
—, *Pucciniastrum americanum* on, in U.S.A., 104.
—, *Sphaerotheca humuli* on, in Canada, 678.
—, streak disease of, in U.S.A., 230.
—, *Verticillium dahliae* can infect, 470; occurrence in Holland, 705.
—, virus diseases of, in U.S.A., 357, 641.
Reclamation disease of barley in Denmark, 656; in Germany, 87.
— — of beans in Denmark, 656.
— — of cereals in Germany, 86.
— — of clover and lucerne in Denmark, 656.
— — of oats in Denmark, 656; in Germany, 86.
— — of peas and swedes in Denmark, 656.
'Red leaf' disease of cotton in India, 567.

[Red] staining of pine in Canada, 123.
'— suture' of peach in U.S.A., 203.
Rehmiellopsis bohemica on *Abies cephalonica* in Scotland, 408.
— — on *Abies concolor* in U.S.A., 408, 734.
— — on *Abies nobilis* in Scotland, 408.
— — on *Abies pectinata* in Czecho-Slovakia, 408.
— — on *Abies pindrow* and *A. pinsapo* in Scotland, 408.
Reseda odorata, beet curly top virus can infect, 447.
Resin, use of, as an adhesive, 140, 286, 435.
—, alcohol, and potassium hydroxide solution, use of, against *Pseudoperonospora cubensis* on cucumber in U.S.A., 493.
— soap as an adhesive, 286.
— -soda as an adhesive, 761.
Reversion of currants in Holland, 705.
Rhabditis, Anulosporium nematogenum on, in U.S.A., 762.
—, *Arthrobotrys oligospora* on, in U.S.A., 512.
—, fungi capturing and parasitizing, in U.S.A., 762.
Rhabdocline pseudotsugae on conifers, legislation against, in Italy, 528.
— — on *Pseudotsuga taxifolia*, control, 66, 67, 406; legislation against, in Germany (proposed), 66; notes on, 66; occurrence in America, 67; in Germany, 64, 65, 66, 255, 257, 406, 578; in Holland, 63; studies on, 63, 65, 255; varietal susceptibility to, 64, 65, 66, 255.
Rhamnus alnifolia, Puccinia lolii on, in Canada, 364.
— *cathartica, Puccinia lolii* on, legislation against, in Esthonia, 800; in Latvia, 672; occurrence in Canada, 364.
Rhinosporidium, systematic position of, 171.
— *seeberi*, notes on, 568.
— (?)— on cattle and the horse in India, 568.
Rhipsalis rosea, mosaic of, in Germany, 570.
Rhizina undulata on conifers in France, 798; in Poland, 550.
— — on pine in Poland, 550.
Rhizoctonia, effect of excretions of, on growth of wheat, 85.
— on bean in U.S.A., 71, 679.
— on coffee in Java, 286.
— on *Eriostemon crowei* forming mycorrhiza in New S. Wales, 312.
— on orchid, symbiotic relations of, 634.
— on pine, 405.
— on *Piper betle* in India, 420.
— on potato in Cyprus, 323.
— on *Pseudotsuga taxifolia*, 405.
— on strawberry in U.S.A., 680.
— on various plants forming mycorrhiza in Italy, 309, 312.
— *bataticola* group A, *R. lamellifera* re-established for, 727.
[*Rhizoctonia bataticola*] group B on *Hevea* rubber, 727.
— — group C, stage of *Macrophomina phaseoli* (q.v.), 727, 763.
— *lamellifera* on *Acacia* in Kenya, 727.
— — on *Casuarina* in Uganda, 727.
— — on citrus in Rhodesia, 727.
— — on coffee in Uganda, 727.
— — on *Eucalyptus* in Rhodesia, 727.
— — on grapefruit in Rhodesia, 727.
— — on *Grevillea* and *Hevea* rubber in Uganda, 727.
— — on mango in Rhodesia, 727.
— — on orange in Rhodesia, 727.
— — on pine and *Pittosporum* in Rhodesia, 727.
— — re-established for *R. bataticola* group A, 727.
— *repens* in *Cattleya bowringiana* and *Laelia anceps*, nitrogen assimilation by, 649.
— —, reactivation of, by association with *Cattleya*, 583.
Rhizoecus coffeae in relation to phloem necrosis of coffee in Surinam, 435.
Rhizopus on citrus in U.S.A., 192.
— on stone fruit in U.S.A., 378.
—, *Trichoderma lignorum* parasitizing, 192.
— *artocarpi* on *Artocarpus integrifolia* in Réunion, 680.
— *nigricans* can infect beet, 849.
— —, decomposition of rape cake by, 593.
— —, effect of certain volatile substances and gases on growth of, 46; of excretions of, on growth of wheat, 85.
— — in soil in China, 656.
— — on banana, 39.
— — on bread in Russia, 625; in U.S.A., 757.
— — on carrot in U.S.A., 4.
— (?) — on coco-nut (copra) in Malaya, 355.
— — on crucifers in U.S.A., 546.
— — on peach and stone fruit in U.S.A., 378.
— — on strawberry in U.S.A., 102.
— — on sweet potato in U.S.A., 671.
— — on tomato in U.S.A., 121.
— —, translocation of protoplasm in, 776.
— *nodosus* in soil in Austria, 191.
— — on sunflower in Russia, 571.
— *tritici* on carrot in U.S.A., 4.
— — on sweet potato in U.S.A., 671.
Rhodochytrium spilanthidis on *Ageratum, Ambrosia, Asclepias, Hibiscus sabdariffa, Solidago*, and *Spilanthes*, 397.
— — on *Spilanthes beccabunga* in Guatemala, 397.
Rhododendron, Armillaria mellea and *Botrytis* on, in U.S.A., 696.
—, *Exobasidium japonicum* on, in Germany, 578.
—, — *vaccinii* on, in U.S.A., 205, 696.
—, *Pestalozzia macrotricha* and *P. rhododendri* on, in U.S.A., 696.
—, *Physarum cinereum* on, in U.S.A., 697.
—, *Phytophthora cactorum* and *P. cinnamomi* on, in U.S.A., 696.

[*Rhododendron*], *Septoria azaleae* on, in Germany, 578; in U.S.A., 696.
—, *Sporocybe azaleae* on, in U.S.A., 696.
— *californicum*, *Lophodermium rhododendri* and *Melampsoropsis piperiana* on, in U.S.A., 696.
— *carolinianum*, *Corticium solani* on, in U.S.A., 697.
— *catawbiense*, *Exobasidium oxycocci* on, in U.S.A., 696.
— *chrysanthum*, *Chrysomyxa alpina* on, in Japan, 596.
— *degronianum*, *Chrysomyxa expansa* on, in Japan, 726.
— *indicum*, *Exobasidium vaccinii* and *Septoria azaleae* on, legislation against, in Germany, 398.
— *maximum*, *Exobasidium oxycocci*, *Lophodermium rhododendri*, *Phomopsis*, *Phyllosticta maximi*, and *P. saccardoi* on, in U.S.A., 696.
— *ponticum*, *Cercospora rhododendri* on, in U.S.A., 696.
— —, *Corticium solani* on, in U.S.A., 697.
— —, mosaic of, and *Thecopsora minima* on, in U.S.A., 696.
Rhus, *Tryblidiella rufula* on, in U.S.A., 790; *Diplodia* stage of, 790.
— *typhina*, *Nectria* on, in U.S.A., 404.
— —, *Verticillium dahliae* can infect, 470.
Rhynchodiplodia citri on lemon in Italy, 200.
Rhynchosporium secalis on rye in Belgium, 676.
Ribes, *Cronartium ribicola* on, specific susceptibility to, and virulence to pine of strains from, in N. America, 407.
— eradication against *Cronartium ribicola* on pine in U.S.A., 203, 356, 739, 799.
—, *Puccinia ribesii-caricis* on, in Germany, 381.
—, see also Currants, Gooseberry.
Rice (*Oryza sativa*), *Alternaria oryzae* on, in Japan, 533.
—, *Brachysporium*, *Cladosporium oryzae*, and *Clasterosporium* on, in Indo-China, 146.
—, (?) *Corticium* on, in Indo-China, 147.
—, — *sasakii* on, in Japan, 331.
—, *Entyloma oryzae* on, legislation against, in U.S.A., 464.
—, *Epicoccum neglectum* on, in Japan, 533.
—, *Fusarium* on, control, 266, 720; notes on, 11; occurrence in British Guiana, 11; in India, 266, 719; in Indo-China, 146; study on, 719; varietal resistance to, 266, 720.
—, *Gibberella fujikuroi* on, control, 533; occurrence in Japan, 532, 590, 719; specialization in, 719; stimulatory effect of, 590; studies on, 532, 590.
—, *Helicoma echinosporium* on, in Japan, 533.
—, *Helminthosporium oryzae* on, in Indo-China, 146.
—, — *sigmoideum* on, *Leptosphaeria salvinii* and *Sclerotium oryzae* stages of, 392; occurrence in Indo-China, 146.
—, *Leptosphaeria salvinii* on, in U.S.A., 392; ascigerous stage of *Helminthosporium sigmoideum* and *Sclerotium oryzae* (q.v.), 392.
[Rice], *Melanomma glumarum* on, legislation against, in U.S.A., 464.
—, *Nigrospora oryzae* on, in Indo-China, 146.
—, *Oospora oryzetorum* on, legislation against, in U.S.A., 464.
—, *Ophiobolus graminis* on, in the Argentine, 683.
—, — *miyabeanus* on, in Japan, 532; in U.S.A., 12.
—, — *oryzinus* on, in U.S.A., 655.
—, *Phoma glumarum* on, in China, 395.
—, *Phyllosticta* on, in Japan, 533.
—, *Piricularia oryzae* on, control, 533; factors affecting, 533, 784; occurrence in India, 266; in Japan, 532, 784; studies on, 532, 784; varietal susceptibility to, 266; viability of, 532.
—, *Sclerospora macrocarpa* on, legislation against, in U.S.A., 464.
—, *Sclerotium oryzae* on, control, 12; *Helminthosporium sigmoideum* and *Leptosphaeria salvinii* stages of, 392; occurrence in Indo-China, 147; in U.S.A., 12; varietal susceptibility to, 12.
—, — *rolfsii* on, in Indo-China, 146.
—, *Sporotrichum* on, in Indo-China, 146.
Ricinus communis, *Bacterium aleuritidis* can infect, 130.
— —, — *ricini* on, in Japan, 554.
— —, — *tumefaciens* can infect, (?) 270, 406.
— —, *Cercosporina ricinella* on, in Italian Somaliland, 247.
— —, *Diplodia tubericola* can infect, 366.
— —, *Physalospora rhodina* and *P. zeicola* can infect, 366.
Ring spot of dahlia in U.S.A., 374, 697.
— — of *Nicotiana affinis* in Rumania, 580.
— — of *Nicotiana glutinosa* in U.S.A., 473.
— — of *Nicotiana quadrivalvis* in Rumania, 580.
— — of *Nicotiana rustica* in U.S.A., 473.
— — of *Nicotiana viscosa* in Rumania, 580.
— — of *Petunia* in U.S.A., 473.
— — of potato in U.S.A., 588; relation of, to potato rugose mosaic, 588; separation of, from 'healthy potato virus', 588. (See also Tobacco ring spot affecting.)
— — of *Solanum capsicastrum*, host range of, and identity of, with spotted wilt of tomato, 59; occurrence in Great Britain, 59; study on, 59; transmission of, (?) by *Myzus persicae*, 59; by *Thrips tabaci*, 59.
— — of tobacco, acquired immunity from, 120; canker formation attributed to, 489; control, 472; effect of host on virus of, 108; of, on pollen development, 472; factors affecting, 120, 472; intracellular bodies in, 473; notes on, 489; occurrence in France, 489; in Rumania, 580; in U.S.A., 108, 120, 472, 473, 673; properties of virus of, 108, 473; relation

of, to potato aucuba mosaic, 472; strains of, 471; studies on, 120, 471; transmission of, by seed, 472; to bean, cowpea, *Nicotiana* spp., *Phaseolus lunatus*, 121; to spinach, 674; virus of, affecting potato and *Solanum carolinense* in U.S.A., 472.
Robinia pseud-acacia, brooming disease of, in U.S.A., 405.
— —, *Verticillium albo-atrum* on, in Holland, 665.
Roggenfusariol, composition of, 305.
—, determination of mercury in, 305; of mercury on grain treated with, 152.
—, use of, against *Fusarium herbarum* on rye and wheat, 278.
Root diseases of tobacco seedlings in U.S.A., 356.
— — of wheat, amputation of roots in relation to, 501.
— nodules of alder in Germany, 312, 649.
— — of *Casuarina cunninghamiana*, *C. equisetifolia*, *C. glauca*, *C. muricata*, *C. quadrivalvis*, and *C. stricta* in India, 583.
— — of *Hippophaë rhamnoides* in Germany, 612.
— rot of citrus in Palestine, 368.
— — of cotton in India, 567.
— — of sugar-cane in Brazil, 57; in Hawaii, 723.
— — of sweet potato in U.S.A., 146.
Rosaceae, *Bacillus amylovorus* on, legislation against, in Portugal, 672.
Rose (*Rosa*), *Bacterium tumefaciens* on, in U.S.A., 633.
—, *Botryosphaeria dothidea* on, in England, Europe, and Germany, 447.
—, — *ribis* var. *chromogena* on, in U.S.A., 633.
—, *Botrytis* on, in U.S.A., 633.
—, — *cinerea* on, in England, 570.
—, *Cephaleuros mycoidea* or *C. parasiticus* on, in the West Indies, 447.
—, *Cercospora rosicola* on, in India, 612.
—, chlorosis of, in Italy, 373.
—, *Coniothyrium wernsdorffiae* on, in U.S.A., 205, 633.
—, *Cryptosporium minimum* on, in Germany, 447.
—, *Diaporthe umbrina* on, control, 25, 696; occurrence in England, 25, 291; in U.S.A., 25, 633, 696.
—, *Diplocarpon rosae* on, control, 25, 223, 573, 696; occurrence in England, 223; in Germany, 570; in U.S.A., 25, 573, 633, 696; varietal susceptibility to, 223, 570.
—, *Eurychora rosicola* on, in Brazil, 447.
—, *Gloeosporium perennans* can infect, 299.
—, — *rosae* on (a *nomen nudum*), 447.
—, *Gnomonia rubi* on, in England, 447.
—, *Hendersonia rosicola* on, in Brazil, 447.
—, infectious chlorosis of, in N. America, 447.
—, *Kuehneola rosae* on, in Japan, 447.
—, leaf bronze of, in America and England, 447.
[Rose], *Leptosphaeria coniothyrium* on, in U.S.A., 633.
— mosaic in N. America, 447.
—, *Neofabraea malicorticis* can infect, 299.
—, *Phoma oleandrina* on, in France, 447.
—, *Phragmidium* on, in U.S.A., 633.
—, — *mucronatum* on, in Egypt, 174.
—, *Sphaceloma rosarum* on, in France, 96; in U.S.A., 96, 447, 633; in various countries, 96; *Elsinoe veneta* distinct from, 96; *Phyllosticta rosarum* renamed, 96.
—, *Sphaerotheca pannosa* on, control, 174, 175, 573, 642, 733; occurrence in Egypt, 174; in Germany, 175, 642, 733; in U.S.A., 573, 696.
—, — — var. *rosae* on, in U.S.A., 633.
—, *Stereum purpureum* on, in England, 447.
—, *Stilbella* on, in Trinidad, 447.
—, *Verticillium dahliae* can infect, 470.
—, — (?) *ovatum* on, in Canada, 447.
—, virus disease of, in U.S.A., 455.
Rosellinia on *Acacia decurrens* and *Albizzia falcata* in Java, 425.
— on cacao in Tanganyika, 552.
— on camphor in Malaya, 355.
(?) — on *Cocos australis* in U.S.A., 79.
— on coffee in Costa Rica, 168; in India, 435.
— *arcuata* on *Crotalaria usaramoensis* in Java, 425.
— — on tea in Java and Sumatra, 425.
— *bunodes* on *Crotalaria anagyroides*, *C. usaramoensis*, *Indigofera arrecta*, and *Leucaena glauca* in Java, 425.
— — on tea in Java and Sumatra, 425.
— — on *Tephrosia candida* in Java, 425.
— *necatrix* can infect *Cladophora*, *Hydrodictyon*, and *Vaucheria*, 307.
— — on begonia in France, 448.
— *pepo* on cacao, 207.
Rosette of blackberry and dewberry in U.S.A., 680.
— of fruit trees, see Little leaf of.
— of groundnut in the Gambia, 5; in S. Africa and Uganda, 143.
— of pecan (zinc deficiency) in U.S.A., 339, 602.
— of *Vinca rosea* in Sierra Leone, 202.
— of wheat in Egypt, 749.
Rotterdam B disease of tobacco in Sumatra, 471.
Rougeau of the vine, control, 487; etiology of, 675; factors affecting, 200, 487; 'flavescence' and 'rougeat' forms of, 487; occurrence in Algeria, 200; in France, 200, 675; in Tunis, 200, 487; studies on, 487, 675; varietal susceptibility to, 200, 487, 675.
Rubber (*Hevea brasiliensis*), *Botryodiplodia theobromae* on, in Ceylon, 785.
—, brown bast of, in the Belgian Congo, 80.
—, decay of stock snag of, in Ceylon, 591.
—, die-back of, in Ceylon, 591; in Malaya, 507.
—, *Diplodia* on, in Ceylon, 591.

[Rubber] diseases in Ceylon, 720; in Java, 425; risk of introducing, into Ceylon, 392.
—, *Fomes lamaensis* on, *F. noxius* confused with, 55.
—, — *lignosus* on, control, 52, 54, 55; factors affecting, 52, 721; note on, 591; occurrence in the Belgian Congo, 80; in Ceylon, 591; in Malaya, 52, 54; in Sumatra, 720; pathogenicity of, 720; studies on, 52, 54, 720.
—, — *noxius* on, in (?) Africa, Ceylon, and Malaya, 55; wrongly referred to *F. lamaensis*, 55.
—, *Ganoderma pseudoferreum* on, in Malaya, 54.
—, *Gloeosporium albo-rubrum* on, in Ceylon, 77.
—, *Helicobasidium compactum* and *Helminthosporium heveae* on, in Java, 425.
—, lightning injury to, in Malaya, 507.
—, *Oidium heveae* on, control, 323, 655; effect of, on yield, 655; factors affecting, 323; occurrence in Ceylon, 323, 655; in Java, Malaya, and Sumatra, 323; study on, 323.
—, *Phytophthora palmivora* on, in Ceylon, 77.
—, *Pythium* on, in Malaya, 507.
—, *Rhizoctonia bataticola* group B on, 727.
—, — *lamellifera* on, in Uganda, 727.
—, sun scorch of, in Ceylon, 591, 784.
Rubus, see Blackberry, Dewberry, Raspberry.
— *argutus*, *Microthyriella rubi* on, in U.S.A., 788; ascigerous stage of *Leptothyrium pomi*, 788.
— *idaeus*, see Raspberry.
— *loganobaccus*, see Loganberry.
— *occidentalis*, see Raspberry.
Rueping process of timber preservation, 70, 670.
Rumex acetosella, *R. crispus*, and *R. altissimus*, *Cercospora beticola* can infect, 269.
Rusts, literature on heterothallism and hybridization in, 530.
— of cereals, estimation of losses caused by, 426.
— of the Dominican Republic, 396; of France, 537; of Japan, 726; of Porto Rico and the Virgin Islands, 246.
Rye (*Secale cereale*), *Calonectria graminicola* on, control, 16, 84, 152, 279; factors affecting, 754; occurrence in Austria, 16; in Germany, 84, 150, 152, 278, 279; strains of, 754.
—, *Claviceps purpurea* on, ergotism due to, in England, Germany, and Russia, 88.
—, *Fusarium* on, in Germany, 150.
—, — *herbarum* on, in Germany, 278.
—, *Gibberella saubinetii* on, in the Argentine, 683.
—, *Helminthosporium inconspicuum* on, in Italy, 660.
—, — *sativum* on, in the Argentine, 683.
—, *Lagena radicicola* on, in Canada, 749.
—, *Leptosphaeria herpotrichoides* on, in Germany, 150.
[Rye], mycorrhiza of, in Italy, 309.
—, *Ophiobolus graminis* can infect, 19; occurrence in the Argentine, 683.
—, — *herpotrichus* on, in Germany, 150.
—, *Puccinia glumarum* can infect, 278.
—, — *graminis* on, factors affecting, 87; hybridization of, with *P. g. tritici*, 87, 208; note on, 15; occurrence in France, 87; in Germany, 149; in Scotland, 87; in U.S.A., 87; physiological forms of, 87; rate of fall of spores of, 498; saltation in, 87; study on, 87; transmitted from wheat, 274.
—, — *secalina* on, grass hosts of, 274; occurrence in Germany, 149, 273; in U.S.A., 78; varietal resistance to, 78.
—, — *triticina* can infect, 274.
—, *Rhynchosporium secalis* on, in Belgium, 676.
—, *Tilletia caries* and *T. foetens* can infect, 683.
—, — *secalis* on, in Rumania, 549; in Russia, 616.
—, *Urocystis occulta* on, in Russia, 616.
—, virus disease of, in Siberia, 307.
'Saatbeize für Roggen', composition of, 306.
Sabouraudites mentagrophytes, see *Trichophyton mentagrophytes*.
— *ruber* on man in Japan, 94.
— —, *Trichophyton coccineum* regarded as a variety of, 443.
— — var. III on man in Japan, 94.
— — — *yamaguchiense* on man in Japan, 443.
— —, see also *Trichophyton rubrum*.
—, see also *Microsporon*, *Trichophyton*.
Saccharomyces on banana, 39.
— on man in U.S.A., 370.
— *ellipsoideus* on dates in U.S.A., 379.
— *malassezi* believed to be distinct from *Pityrosporum ovale*, 442.
— *ovalis* synonym of *Pityrosporum ovale*, 442.
Saccharomycodes ludwigii, use of, in the preparation of tea cider, 249, 597, 661.
Saccharum spp., *Ustilago* on, 723.
— *officinale*, see Sugar-cane.
Sagittaria sagittifolia, *Ceratostomella paradoxa* on, from China, 335.
Sahlbergella singularis in relation to cacao canker in the Belgian Congo, 80.
Salicylanilide, a constituent of shirlan (q.v.), 403.
Salicylic acid, regulations for use of, as a food preservative, 695.
— —, toxicity of, to ringworm fungi, 509; to *Trichothecium roseum*, 523.
Salix, *Aleurodiscus oakesii* on, in U.S.A., 601.
—, *Fusarium lateritium* var. *fructigenum* on, specialization in, 99.
—, *Fusicladium saliciperdum* on, see *Venturia chlorospora* on.
—, *Venturia chlorospora* on, in U.S.A., 251, 855.
— *alba*, *Pseudomonas saliciperda* on, in Holland, 60; transmission of, by *Cryptorrhynchus lapathi*, 61.

[*Salix alba*] var. *vitellina*, *Venturia chlorospora* on, in U.S.A., 355.
— *amygdalina*, *Jaraia salicis* on, in Czecho-Slovakia, 62.
— —, *Pseudomonas saliciperda* on, in Holland, 60; transmission of, by *Cryptorrhynchus lapathi*, 61.
— *babylonica*, *Cytospora* on, in U.S.A., 270.
— — var. *aurea*, *Septomyxa*-like fungus on, in U.S.A., 356.
— *caprea*, *Bacterium tumefaciens* on, in Finland, 797.
— —, *Uncinula salicis* on, in Sweden, 666.
— *fragilis*, *Jaraia salicis* on, in Czecho-Slovakia, 62.
— *nigra*, *Gloeodes pomigena* on, in U.S.A., 298.
— *purpurea*, *Jaraia salicis* on, in Czecho-Slovakia, 62.
— —, *Pseudomonas saliciperda* on, in Holland, 60; transmission of, by *Cryptorrhynchus lapathi*, 61.
— *viminalis*, *Jaraia salicis* on, in Czecho-Slovakia, 62.
Salol, see Phenyl salicylate.
Salpiglossis sinuata, tomato mosaic can infect, 206.
Salt, see Sodium chloride.
Saltation in *Alternaria kikuchiana*, 768; in *Aspergillus fischeri*, 529; in *Brachysporium*, 584; in *Colletotrichum*, 267; in *Cytosporina ludibunda*, 377, 573, 782; in *Fusarium lateritium* var. *fructigenum* and *F. vasinfectum*, 782; in *Glomerella cingulata*, 8; in *Helminthosporium*, 584, 782; in *H. monoceras* and *H. pedicellatum*, 782; in *H. sativum*, 561, 755; in *Puccinia glumarum*, 273; in *P. graminis*, 87.
—, nature of, 782.
—, see also Variation.
Salvia splendens, beet curly top virus can infect, 447.
Sand drown of tobacco in U.S.A., 146.
Sandalwood (*Santalum album*) spike disease, biochemistry of, 340; control, 129; intracellular bodies in, 479; *Lantana camara* in relation to, 129; losses caused by, 479; occurrence in India, 129, 340, 479; transmission of, (?) by Curculionidae, 129; varietal resistance to, 129.
Sansevieria robusta, *Gloeosporium somalense* on, in Somaliland, 536.
— *stuckii*, *Plenodomus nigricans* on, in Somaliland, 536.
Santalum album, see Sandalwood.
Sapamines as spray spreaders, 305.
Saponin, use of, against *Puccinia glumarum*, *P. graminis*, and *P. triticina* on wheat, 272; as an adhesive, 26.
Saprolegnia parasitica on fish in U.S.A., 93.
Sarcophagophilus, *Tripospórium stapeliae* on, in S. Africa, 764.
Sassafras variifolium, *Gloeodes pomigena* on, in U.S.A., 298.
Scab of beet in Austria, 135; in Czecho-Slovakia, 545.
['Scab'], use of the term in plant pathology, 596.
Scabiosa atropurpurea, curly top of beet affecting, in U.S.A., 446.
— *succisa*, *Fusarium anthophilum* on, in France, 292.
Scald of apple in New S. Wales, 703; in U.S.A., 423. (See also Deep, Soft, and Spot scald of.)
Scale insects, *Cordyceps clavulata* on, in Sweden, 567.
Scaly bark of citrus in S. Africa, see Psorosis.
Sch. 987, composition and use of, against *Venturia inaequalis*, 31.
Schizophoma (?) *pini* on pine, conidial formation in, 790; *Sphaeronema pityophilum* synonym of, 790.
Sclerocystis coremioides not accepted as a synonym of *Sclerotium rolfsii* or *Tuber zeylanicum*, 248.
Sclerophoma magnusiana, conidial formation in, 790.
— *pityophila* and *S. strobi* on pine, conidial formation in, 790.
— *taxodii* on *Taxodium*, conidial formation in, 790.
Sclerosis of orange in Italy, 746.
Sclerospora on maize, legislation against, in S. Rhodesia, 463.
— on *Panicum trypheron* in India, 551.
— on sorghum in Tanganyika, 552.
— *butleri* on *Eragrostis aspera* in Nyasaland, 766.
— *graminicola* on *Setaria italica*, factors affecting, 564, 624; germination of, 624; losses caused by, 165; occurrence in Japan, 564, 623; in Russia, 165; studies on, 564, 624; viability of, 565, 625.
— — on *Setaria viridis* in Japan, 623; in Russia, 165.
— —, physiologic specialization in, 433.
— *indica* on maize in the Caucasus, 505.
— *macrocarpa* on rice, legislation against, in U.S.A., 464.
— *macrospora* on *Phragmites* and wheat in Italy, 537.
— *sacchari* on sugar-cane in Queensland, 787.
Sclerotial fungi on cereals and grasses in U.S.A., 367.
Sclerotinia, antagonism of, to *Ophiobolus graminis*, 684.
— on citrus in Sicily, 758.
—, toxicity of copper resinate and sulphate to, 182.
— *americana* on apricot in Victoria, 703.
— — on peach, control, 11, 102, 145, 229, 379, 573, 703, 709; factors affecting, 102, 228, 378; losses caused by, 228, 378; occurrence in Australia, Canada, and New Zealand, 228; in U.S.A., 11, 102, 145, 228, 378, 573, 709; in Victoria, 703; relation of *Conotrachelus nenuphar* and *Grapholitha molesta* to, 228; *S. fructicola* preferred as name for, 228; study on, 228; varietal resistance to, 228.
— — on stone fruits in U.S.A., 378.

[*Sclerotinia americana*], toxicity of oils and other substances to, 229; of sulphur, selenium, and tellurium to, 107.
— —, zonation in, 781.
— *cinerea* on apple, control, 99; factors affecting, 99; occurrence in England, 99, 353, 488; varietal susceptibility to, 353, 488.
— — on apricot, control, 301, 302, 451; factors affecting, 302; note on, 703; occurrence in Austria, 703; in France, 301, 302; in Switzerland, 451; varietal resistance to, 302.
— — on cherry, control, 99, 640; factors affecting, 99, 640; occurrence in Czecho-Slovakia, 640; in England, 99, 488; in Germany, 640; in Hungary, 640.
— — on plum in England, 99, 488.
— — on stone fruits in Hungary, 575.
— —, toxicity of hydrophilic colloidal sulphur to, 356; of various disinfectants to, 523.
— —, zonation in, 781.
— *cydoniae* on quince in England, 488.
— *fructicola*, see *S. americana*.
— *fructigena*, antagonism of bacteria to, 109.
— — on apple, control, 103, 766; factors affecting, 702; notes on, 103, 179; occurrence in Austria, 702; in England, 103, 766; study on, 702; varietal resistance to, 702.
— —, zonation in, 781.
— *fuckeliana*, ascigerous stage of *Botrytis* on vine, 316.
— — on chrysanthemum in Belgium, 677.
— — on citrus in Italy, 746.
— — on vine in Rumania, 549.
— *laxa*, see *S. cinerea*.
— *minor* on lemon in Sicily, 282.
— — on lettuce in Germany, 485.
— — on orange in Sicily, 282.
— *oxycocci* on cranberry in U.S.A., 205.
— *sclerotiorum* on *Antirrhinum majus* in U.S.A., 291.
— — on bean in U.S.A., 71, 292.
— — on cabbage in Bermuda, 421.
— — on carrot in Bermuda, 421; in U.S.A., 4.
— — on celery in U.S.A., 292.
— — on citrus in Italy, 746.
— — on crucifers in U.S.A., 546.
— — on cucumber in Germany, 417.
— — on dahlia in Austria, 26.
— — on lemon in Sicily, 282.
— — on lettuce, control, 485; occurrence in Bermuda, 421; in Germany, 485; in Holland, 780.
— — on orange in Sicily, 282, (?) 758.
— — on *Phaseolus lunatus* in U.S.A., 780.
— — on sunflower in Russia, 571.
— — on sweet potato in U.S.A., 671.
— — on tobacco in Germany, 729; *Trichothecium roseum* parasitizing, 729.
— — on tomato, control, 193; factors affecting, 780; notes on, 421; occurrence in Bermuda, 421; in New Zealand, 193; study on, 780.
[*Sclerotinia*] *trifoliorum* in seed samples of clover in Denmark, 294.
Sclerotium cacticola on *Opuntia* in Holland, 634.
— *cepivorum* on onion, breeding against, 140; control, 4; factors affecting, 4; occurrence in England, 140; in Russia, 610; in S. Africa, 4, 135; varietal resistance to, 140.
— *oryzae* on rice, control, 12; *Helminthosporium sigmoideum* and *Leptosphaeria salvinii* stages of, 392; occurrence in Indo-China, 147; in U.S.A., 12; varietal susceptibility to, 12.
— *rhizodes* on turf in Canada and U.S.A., 450.
— *rolfsii*, antagonism of bacteria to, 109.
— — not accepted as synonym of *Tuber zeylanicum*, 248.
— — on apple in New S. Wales, 377.
— — on aster (China) in S. Africa, 175.
— — on bean in U.S.A., 671.
— — on citrus in U.S.A., 192.
— — on cotton in India, 551.
— — on *Eleusine coracana* in India, 267.
— — on groundnut in U.S.A., 357.
— — on hemp in India, 612.
— — on *Luffa aegyptiaca* and maize in Sierra Leone, 203.
— — on *Piper betle* in India, 420; in Malaya, 355.
— — on rice in Indo-China, 146.
— — on strawberry in U.S.A., 495.
— —, *Sclerocystis coremioides* not accepted as synonym of, 248.
— —, *Sclerotium zeylanicum* said to be synonym of, 248.
— —, *Trichoderma lignorum* parasitizing, 192.
— *tulipae* on *Liriope spicata* in [illegible]a, 725.
— *zeylanicum* said to be sy[illegible]nym of *S. rolfsii*, 248.
Scolecodothis pinicola synonym of *Lophodermium pinastri*, 254.
Scolecotrichum graminis on *Phyllostachys* in China, 395.
— *musae* on banana (?) in Queensland, 458; in Sierra Leone, 552.
Scolochloa festucacea, *Puccinia lolii* on, in Canada, 364.
Scolopendrium vulgare, *Gloeosporium nicolai* on, in France, 373.
Scolytus, transmission of *Ceratostomella ulmi* on elm by, in Bulgaria, 252; in Holland, 126, 478; in Italy, 734; in U.S.A., 795.
SCOPP, see Sodium 2-chloro-orthophenylphenolate.
Scopularia venusta (?) identical with *Ceratostomella penicillatum*, 409.
Scopulariopsis on cacao in England, 149.
—, production of arsenical gas by, 384.
Scorzonera humilis, *Ustilago scorzonerae* on, in Germany, 88.
Secale cereale, see Rye.
Sedum, *Bacterium tumefaciens* on, biochemistry of, 148.
Seed-borne diseases, method of estimating, on seeds of forest trees in Russia, 251.

[Seed] disinfectant dusts, method of testing adhesiveness of, to seed-grain, 558.
— disinfection apparatus, 16, 430, 501, 617, 643.
— —, co-operative methods for, 559.
Segetan-nassbeize, composition of, 306.
— -neu, use of, against wheat bunt, 683.
Selenium, toxicity of, to fungus spores, 106.
— compounds, decomposition of, by *Penicillium brevicaule*, 714.
Semesan, use of, against *Actinomyces scabies* on potato, 652; against *Phytophthora richardiae* on *Zantedeschia aethiopica*, 27; against *Plasmodiophora brassicae* on rape, 412.
— bel, use of, against *Actinomyces scabies* on potato, 462; against *Ceratostomella fimbriata* on sweet potato, 612; against *Corticium solani* on potato, 651; against *Monilochaetes infuscans* on sweet potato, 612.
Separat seed dusting apparatus, 430.
Septobasidium lanatum on tea in Cochin-China, 331.
Septomyxa-like fungus on *Salix babylonica* var. *aurea* in U.S.A., 356.
Septoria on begonia in Germany, 448.
— on poplar in Canada, 123.
— *acicola* on pine in U.S.A., 332.
— *apii* on celery, control, 233, 546, 743, 744; factors affecting, 196, 743, 747; losses caused by, 421; occurrence in Bermuda, 421; in Cyprus, 747; in England, 546; in Germany, 233, 747; in New Zealand, 744; in Switzerland, 743; in U.S.A., 196; studies on, 196, 743; varietal resistance to, 196, 743.
— — *-graveolentis* on celery in U.S.A., 196.
— *apocyni* on *Apocynum venetum* in Russia, 631.
— *azaleae* on *Rhododendron* in Germany, 578; in U.S.A., 696.
— — on *Rhododendron indicum*, legislation against, in Germany, 398.
— *ceratoniae* on *Ceratonia siliqua* in Italy, 660.
— *chrysanthemi* on chrysanthemum in Belgium, 677.
— *citri* var. *minor* on citrus in Italy, 746.
— *gasparrini* on *Pistacia* in Italy, 660.
— *glaucescens* renamed *Cytosporina glaucescens*, 759.
— *helianthi* on sunflower in Russia, 571.
— *iridis-japonicae* on *Iris japonica* in Italy, 293.
— *lycopersici* on tomato, control, 11, 206; notes on, 206, 267; occurrence in U.S.A., 11, 206, 233, 267; varietal susceptibility to, 11.
— *maydis* on maize in the Caucasus, 505.
— *paeoniae* on peony in U.S.A., 205.
— *rostrupii* on chrysanthemum in Belgium, 677.
— *rubi* on blackberry in U.S.A., 79.
Sereh disease of sugar-cane in Ceylon, 77; in Java, 57; varietal resistance to, 57.
Serological studies on *Aspergillus fumigatus* and *A. niger*, 445; on *Bacillus amylovorus*, 376; on *B. aroideae*, *B. carotovorus*, *B. coli communis*, *B. phytophthorus*, *Bacterium dissolvens*, and *Bact. tabacum*, 426; on *Pseudomonas citriputeale*, *P. prunicola*, and *P. syringae*, 376.
Sesame (*Sesamum indicum*), bacterial disease of, in Tanganyika, 552.
—, *Cercospora sesami* on, in Uganda, 422.
—, — — var. *somalensis* on, in Italian Somaliland, 247.
—, *Helminthosporium* (?) *gigasporum* subsp. *javanicum* on, in Tanganyika, 552.
—, — *sesami* on, in Italy, 660
—, leaf curl (? virus) of, in Tanganyika, 552, 748; in Uganda, 748.
—, *Macrophomina phaseoli* can infect, 267.
—, *Oospora* on, in Tanganyika, 552.
Sesamum radiatum, (?) infectious chlorosis of, in Sierra Leone, 202.
Setaria italica, *Brachysporium* on, in Japan, 584.
— —, *Gibberella fujikuroi* can infect, 590.
— —, *Sclerospora graminicola* on, factors affecting, 564, 624; germination of, 624; losses caused by, 165; occurrence in Japan, 564, 623; in Russia, 165; studies on, 564, 624; viability of, 565, 625.
— —, *Ustilago crameri* and *U. neglecta* on, in Russia, 617.
— *viridis*, *Sclerospora graminicola* on, in Japan, 623; in Russia, 165.
'Sewage fungus', see *Fusarium aquaeductum* and *Leptomitus lacteus*.
Sewardiella tuberifera, mycorrhiza of, 235.
Sewers, *Geotrichum matalense* var. *chapmani* in, in England, 117.
Shallot (*Allium ascalonicum*), *Cercospora duddiae* on, in Sierra Leone, 203.
—, *Phoma terrestris* on, in U.S.A., 547.
Shiraia bambusicola on bamboo in China, 247.
Shirlan HB, use of, against *Cladosporium fulvum* on tomato, 403.
— paste, use of, against *Erysiphe cichoracearum* on cucumber, 744.
Silkworms (*Bombyx mori*), *Spicaria prasina* on, in China, 396.
Silver cyanide a constituent of segetan-nassbeize, 306.
— leaf disease of peach in Italy, 492.
— — —, see also *Stereum purpureum*.
— scurf of orange in Palestine, 284.
Simulid larvae, *Stipella vigilans* on, in Alpine waters, 512.
Single cell isolation technique, 579.
Sisal (*Agave rigida* var. *sisalana*), *Pythium aphanidermatum* on, in Kenya, 9.
— rot in Tanganyika, 201.
'Small hop' disease of hops in England, 112.
Smilax hispida, *Gloeodes pomigena* on, in U.S.A., 299.
Smoke injury to plants, German book on, 524.
Smuts, see Ustilaginales.

Smuttox, use of, against *Ustilago avenae* on oats, 144.
Snow mould of turf, non-sclerotial type of, in N. America, 450.
Snowberry (*Symphoricarpos racemosus*), *Sphaceloma symphoricarpi* on, in U.S.A., 661.
Soap as a spreader, 175, 182, 298.
Soda, see Sodium carbonate.
Sodium acetate, use of, against moulds on hides, 94.
— bicarbonate, use of, against *Alternaria citri* on orange, 215; against decay of orange, 215; against *Penicillium digitatum* on orange, 759; against wood-staining fungi, 669.
— carbonate as a constituent of brogdite, 226; of laux, 226.
— —, toxicity of, to *Penicillium expansum*, 226.
— —, use of, against *Ceratostomella* on timber, 345; against *Phragmidium mucronatum* on rose, 174; against *Plasmodiophora brassicae* on cabbage, 493; against *Podosphaera leucotricha* on apple, 298; against *Sphaerotheca pannosa* on rose, 174; against timber moulding or staining fungi, 344, 669.
— chloride, toxic effects of, on plants, 781.
— —, toxicity of, to *Cladosporium fulvum*, 713.
— —, use of, against moulds on hides, 94; in the treatment of fence posts, 342.
— 2-chloroorthophenylphenolate, use of, against *Ceratostomella* on timber, 668.
— fluoride as a constituent of triolith, 262.
— —, use of, as a timber preservative, 1.
— hydroxide, use of, against *Phytophthora infestans* on potato, 549.
— hypochlorite, toxicity of, to *Penicillium expansum*, 227; to ringworm fungi, 509.
— —, use of, against *Septoria apii* on celery, 743.
— nitrate, toxic effects of, on plants, 781.
— oleate, effect of, on *Alternaria solani* and *Venturia inaequalis*, 268.
— orthophenylphenolate, use of, against timber moulding and staining fungi, 344.
— phosphate as a constituent of laux, 226.
— sulphate, toxic effects of, on plants, 781.
— tetrachlorophenolate, use of, against *Ceratostomella* on timber, 668; against timber moulding and staining fungi, 344.
— thiobenzoate, toxicity of, to fungi, 304.
Soft scald of apple in U.S.A., 103.
Soil bacteria and fungi, decomposition of plant materials by, 393.
— disinfection, absorption of fungicides in relation to, 267.
— — against *Aphanomyces raphani* on radish, 351; against *Bacterium tabacum* on tobacco, 475, 491; against *Bact. tumefaciens* on fruit trees, 516; against *Cladosporium cucumerinum* on cucumber, 485; against damping-off of conifers, 269; against damping-off organisms, 643; against *Fusarium angustum* on cotton, 287; against *F. lycopersici* on tomato, 403; against *F. orthoceras* on cotton, 287; against *F. oxysporum cubense* on banana, 381; against *F. vasinfectum* var. *inodoratum* on cotton, 287; against greenhouse and seed-bed diseases, 42; against *Phymatotrichum omnivorum* on cotton, 287; against *Phytophthora colocasiae* on *Piper betle*, 355; against *P. parasitica nicotianae* on tobacco, 145; against *Sclerotinia minor* and *S. sclerotiorum* on lettuce, 485; against *Sclerotium rolfsii* on apple, 377; on *Piper betle*, 355; against *Septoria apii* on celery, 546; against *S. lycopersici* on tomato, 11; against *Thielaviopsis basicola* on *Primula obconica*, 514; against tobacco seedling diseases, 356; against *Verticillium albo-atrum* on tomato, 403.
[Soil] fungi, factors affecting, 140, 191, 324, 534, 721; occurrence in China, 721; in England, 140; in Manitoba, 534; in Siberia, 191; in U.S.A., 56, 324.
— micro-organisms, antagonism of, to cereal foot-rotting and other fungi, 785.
— —, availability of nitrogen in fungous tissues to, 533.
— —, Cholodny technique for the study of, 324, 735.
— sterilization by electricity against *Synchytrium endobioticum* on potato, 651.
— — by heat against *Corticium solani* on cucumber, 710; against greenhouse and seed-bed diseases, 42; against *Helminthosporium cactacearum* on *Cereus* spp., 27; against *Plasmodiophora brassicae* on swedes and *Pythium de Baryanum* on cauliflower, 10.
— — by steam against *Corticium* (?) *solani* and *Pythium de Baryanum* on *Lupinus texensis*, 96; against *P. ultimum* on tomatoes, 122.
— — — —, 'Alfa' apparatus for, 460.
— — — —, methods of, in U.S.A., 42.
Soja, see Soy-bean.
Solanaceae, *Bacterium solanacearum* on, in Porto Rico, 793.
—, mosaic of wild, in Rumania, 580.
Solanum aculeatissimum and *S. blodgettii*, *Stemphylium solani* on, in U.S.A., 60.
— *caldasii*, *Phytophthora infestans* on, in France, 75.
— *capsicastrum*, ring spot of, host range of, 59; identical with spotted wilt of tomato, 59; occurrence in Great Britain, 59; transmission of, by *Thrips tabaci* and (?) *Myzus persicae*, 59.
— —, tomato spotted wilt can infect, 730.
— *carolinense*, *Stemphylium solani* can infect, 60.

[*Solanum carolinense*], tobacco ring spot affecting, in U.S.A., 472.
— *commersonii*, *Phytophthora infestans* on, in France, 75.
— *demissum*, resistance of, to *Phytophthora infestans*, 75, 190, 390.
— *dulcamara*, tomato yellow mosaic may infect, 402.
— *etuberosum* (? *S. edinense*), *Phytophthora infestans* on, in Germany, 390.
— *incanum*, *Aecidium tubulosum* on, in Sierra Leone, 553.
— *integrifolium*, *Bacterium solanacearum* can infect, 488.
— *laciniatum*, *Phytophthora infestans* on, in France, 75.
— *melongena*, see Eggplant.
— *nigrum*, *Stemphylium solani* can infect, 60.
— —, tobacco mosaic can infect, 120; occurrence in U.S.A., 333.
— —, — veinbanding virus can infect, 588.
— —, tomato yellow mosaic can infect, 402.
— *nodiflorum*, 'healthy potato virus' can infect, 318.
— —, tomato aucuba mosaic on, cytology of, 525; intracellular bodies in, 526.
— *racemigerum*, *Didymella lycopersici* can infect, 477.
— *tuberosum*, see Potato.
— *verbascifolium*, *Stemphylium solani* on, in U.S.A., 60.
Solbar, use of, against *Cladosporium fulvum* and *Didymella lycopersici* on tomato, 233; against fruit diseases, 295; against *Hemileia vastatrix* on coffee, 286; against *Plasmodiophora brassicae* on cabbage, 233; against *Venturia inaequalis* on apple, 31.
Solidago, *Rhodochytrium spilanthidis* on, 397.
Solignum, use of, as a wound dressing for tea, 597.
Sooty mould of plum in Austria, *Eulecanium corni* in relation to, 575.
Sorbus, see *Pyrus*.
Sordaria uvicola on vine in Rumania, 486.
Sorghum (*Andropogon sorghum*), *Cercospora sorghi* on, in China, 395.
—, *Colletotrichum graminicolum* on, in India, 212.
—, *Gibberella fujikuroi* on, 590.
—, *Sclerospora* on, in Tanganyika, 552.
—, *Sorosporium reilianum* on, in Russia, 617.
—, *Sphacelotheca cruenta* on, control, 552, 617; heterothallism in, 89; hybridization of, with *S. sorghi*, 89, 432; occurrence in China, 395; in Russia, 617; in Tanganyika, 552; in U.S.A., 89, 432.
—, — *sorghi* on, control, 552, 617; heterothallism in, 89; hybridization of, with *S. cruenta*, 89, 432; occurrence in Russia, 617; in Tanganyika, 552; in U.S.A., 89, 432; physiologic forms of, 432; varietal susceptibility to, 432.
—, (?) stripe disease of, in Trinidad, 757.
—, *Tilaeospora andropogonis* on, in China, 248; *Ramulispora andropogonis* synonym of, 248.
[Sorghum], *Ustilago bulgarica* and *U. sorghicola* on, in Russia, 617.
Sorodiscus synonym of *Plasmodiophora*, 468.
—, taxonomic notes on, 468.
— *callitrichis* synonym of *Sorosphaera veronicae*, 469.
Sorosphaera synonym of *Plasmodiophora*, 468.
—, taxonomic notes on, 468.
— *junci* synonym of *S. veronicae*, 469.
— *veronicae* on *Veronica americana* in U.S.A., 468; synonymy of, 469.
Sorosporium reilianum on maize, control, 563, 617; note on, 552; occurrence in Russia, 165, 617; in Tanganyika, 552; in U.S.A., 563; study on, 563.
— — on sorghum in Russia, 617.
Souring of dried prunes in U.S.A., 379.
Soy-bean (*Glycine*, *Soja*), *Bacterium* (?) *phaseoli* var. *sojense* on, in Japan, 554.
— —, bean mosaic can infect, 614.
— —, *Cercospora daizu* on, in U.S.A., 612.
— —, damping-off of, in U.S.A., 109.
— —, virus disease of, in Siberia, 307.
Speck spot of tobacco in U.S.A., 205.
Spermophthora gossypii on cotton, 566.
Sphaceloma on avocado pear in Brazil, 707.
— on violet in U.S.A., 449.
— *fawcettii*, see *Sporotrichum citri*.
— — var. *viscosa* on orange (?) in the Argentine, 689; in Brazil, 689.
— *mattirolianum* on *Arbutus unedo* in Germany, 661; in Italy, 661; *Hadrotrichum populi* var. *arbuti* and *Illosporium mattirolianum* synonyms of, 661.
— *rosarum* on rose in France, 96; in U.S.A., 96, 447, 633; in various countries, 96; *Phyllosticta rosarum* renamed, 96.
— *symphoricarpi* on snowberry in U.S.A., 661.
—, see also *Elsinoe*.
Sphacelotheca cruenta on sorghum, control, 552, 617; heterothallism in, 89; hybridization of, with *S. sorghi*, 89, 432; occurrence in China, 395; in Russia, 617; in Tanganyika, 552; in U.S.A., 89, 432.
— *sorghi* on sorghum, control, 552, 617; heterothallism in, 89; hybridization of, with *S. cruenta*, 89, 432; occurrence in Russia, 617; in Tanganyika, 552; in U.S.A., 89, 432; physiologic forms of, 432; varietal susceptibility to, 432.
Sphaeronema on cacao, 207.
— *acicola* renamed *Stictophoma acicola*, 790.
— *pityophilum* renamed *Schizophoma* (?) *pini*, 790.
Sphaerophragmium acaciae on *Albizzia lebbek* in China, 724; in Réunion, 680.
Sphaeropsidales, list of, in the Balearic Isles and Iberian Peninsula, 789.
Sphaeropsis on pineapple pear in U.S.A., 680.

[*Sphaeropsis*] *nervisequa* renamed *Haplosporella nervisequa*, 666.
— *pitya* renamed *Blastophoma thuemeniana*, 790.
— *tumefaciens* on citrus, legislation against, in Italy, 565.
Sphaerostilbe coccidophthora on *Aulacaspis pentagona* in the Seychelles, 144.
— *repens* on cacao, 207.
— — on lime in Dominica, 21.
— — on *Poinciana regia* in Ceylon, 77.
Sphaerotheca humuli on raspberry in Canada, 678.
— — on strawberry in Holland, 705.
— —, toxicity of glyceride oils to, 576.
— — var. *fuliginea*, homothallism in, 650.
— — — — on sunflower in China, 396.
— *mors-uvae* on gooseberry, breeding against, 519; control, 451, 640; occurrence in Denmark, 640; in Germany, 519, 578; in Holland, 705; in Switzerland, 451.
— *pannosa* on rose, control, 174, 175, 573, 642, 733; occurrence in Egypt, 174; in Germany, 175, 642, 733; in U.S.A., 573, 696.
— — var. *rosae* on rose in U.S.A., 633.
Spicaria prasina on silkworms in China, 396.
Spike disease of sandal, biochemistry of, 340; control, 129; intracellular bodies in, 479; *Lantana camara* in relation to, 129; losses caused by, 479; occurrence in India, 129, 340, 479; transmission of, (?) by Curculionidae, 129; varietal resistance to, 129.
Spilanthes, *Rhodochytrium spilanthidis* on, 397.
— *beccabunga*, *Rhodochytrium spilanthidis* on, in Guatemala, 397.
Spinach (*Spinacia oleracea*), beet curly top can infect, 349.
—, — mosaic can infect, 674.
—, *Cercospora beticola* can infect, 269.
—, cucumber mosaic on, in U.S.A., 673.
— diseases, control, 264.
—, *Entyloma ellisii* on, from Cuba, 335.
—, *Peronospora effusa* on, in U.S.A., 417.
—, *Pythium ultimum* on, in France, 488.
—, tobacco ring spot can infect, 674.
Spindle tuber of potato, in U.S.A., 48; recent work on, 187.
Splenomegaly in man, *Aspergillus fumigatus*, *A. hortai*, *A. nantae*, and *A. tunetana* in relation to, 445.
Spongospora synonym of *Plasmodiophora*, 468.
—, taxonomic notes on, 468.
— *campanulae*, *Clathrosorus campanulae* renamed, 468.
— *subterranea* on potato, control, 239; factors affecting, 239; legislation against, in Bulgaria, 592; in Russia, 589; occurrence in the Caucasus, 589; in Germany, 239; varietal susceptibility to, 239.
Sporocybe azaleae on *Rhododendron* in U.S.A., 696.
Sporotrichum in air of apple orchards in England, 32.
— in soil in Austria, 191.
— on rice in Indo-China, 146.
— *beurmanni*, effect of ether on growth and virulence of, 23.
— *citri* on citrus, chemical factors in susceptibility to, 166; control, 166, 495; historical records of, 625; notes on, 202; occurrence in Africa, Asia, Australia, and Panama Canal Zone, 626; in Dominica, 21; in Jamaica, 166; in Mexico, New Zealand, and Oceania, 626; in Porto Rico, 166; in Sierra Leone, 202; in S. America, 626; in U.S.A., 495; in West Indies, 626; specific and varietal resistance to, 166, 202.
— — on grapefruit and lemon in Jamaica, 166; in Sierra Leone, 202.
— — on lime in Sierra Leone, 202.
— — on orange, control, 166, 433, 689; factors affecting, 433; occurrence in Dominica, 21; in Jamaica, 166; in Sierra Leone, 202, 553; in St. Lucia, 689; in Trinidad, 433; varietal susceptibility to, 166.
— *flavicans* on cacao in England, 149.
— *gougeroti*, H-ion concentration in relation to, 569.
— *isariae* on *Isaria farinosa* in Great Britain, 216.
— *mansoni* on man in Porto Rico, 246; *Cladosporium mansoni* synonym of, 246.
— *schenckii*, H-ion concentration in relation to, 569.
— — on man, toxicity of pine oils to, 291.
Spot necrosis of tobacco, attempted immunization against, 398; occurrence in Rumania, 580; in U.S.A., 108, 398; properties of virus of, 108; relation of, to mottle, 108.
— scald of apple in Canada, 299.
Spotted wilt of tomato, control, 731; host range of, 59, 730; note on, 142; occurrence in Australia, 59; in the British Isles, 59, 541, 730; in S. Australia, 142; quantitative study of, by local lesions, 525; ring spot of *Solanum capsicastrum* identical with, 59; studies on, 59, 730; transmission of, by pruning, 730; by *Thrips tabaci*, 59, 730; to tobacco, 526; virus of, affecting tobacco in S. Australia, 142.
Spotting of citrus (non-parasitic) in Italy, 746.
Spraing of potato, etiology of, 239, 319, 321, 392, 653; factors affecting, 239, 321, 392, 652; hereditary type of, 319; occurrence in Germany, 239, 321, 391, 652, 653; in Switzerland, 653; studies on, 391, 652; transmission of, through seed tubers, 319, 392; varietal susceptibility to, 239, 391, 653.
Spray calendars for apple, cherry, peach, pear, plum, and vine in U.S.A., 572; for pome and stone fruits in U.S.A., 699.

[Spray] injury, 11, 12, 28, 29, 30, 31, 325, 358, 453, 613, 639, 709, 775; to apple, study on, 28.
— spreaders, definition of, 305.
— —, effect of, on toxicity of fungicides, 268.
— —, progress in the development of, 305.
— stickers, definition of, 305.
— warning services against apple diseases, 102, 295, 296; against potato diseases, 76, 241, 613; against *Plasmopara viticola* on the vine, 72, 73.
Spraying apparatus, 577.
— —, prevention of accidents in the use of high pressure, 459.
— —, stationary v. portable, in U.S.A., 642.
—, community, against orchard diseases in Germany, 295.
Spruce (*Picea*), *Armillaria mellea* on, in Scotland, 130.
—, *Ascochyta piniperda* on, in Germany and Sweden, 667.
—, *Ceratostomella penicillata* on, in Switzerland, 409; ascigerous stage of *Leptographium penicillatum*, 409; *Ips typographus* and *Pityogenes chalcographus* in relation to, 409; *Scopularia venusta* may be identical with, 409.
—, *Chrysomyxa cassandrae*, *C. ledi*, and *C. ledicola* on, in U.S.A., 67, 799.
—, — *rhododendri* on, in Switzerland, 67.
—, *Cytospora* on, in U.S.A., 407.
—, *Elaphomyces* as mycorrhizal symbiont of, in Scotland, 529.
—, *Fomes annosus* on, in Germany, 738.
—, — *robustus* f. *pinuum* on, in Russia, 666.
—, *Leptographium penicillatum* on, see *Ceratostomella penicillata*.
—, *Melampsoropsis abietina*, *M. cassandrae*, and *M. ledicola* on, in U.S.A., 67, 799.
—, *Polyporus borealis* on, in Germany, 739.
—, witches' broom of, in Germany, 409, 664.
Squash (*Cucurbita*), *Bacterium cucurbitae* on, in U.S.A., 547.
Squirter disease of banana in Australia, 40.
Stachylidium theobromae on banana in Eritrea, 745.
Stachylina longa on *Cricotopus*, *Diamesa*, and *Tanytarsus* in Alpine waters, 512.
— *macrospora* on *Diamesa* in Alpine waters, 512.
Stagonospora curtisii can infect *Hippeastrum*, 79.
— — on *Narcissus* in U.S.A., 79; relation of, to *Phyllosticta* on *Hippeastrum*, 80.
Stalk necrosis of sugar-cane in Hawaii, 723.
Stapelia, *Triposporium stapeliae* on, in S. Africa, 764.
Staphylococcus aureus, toxicity of substances produced by *Penicillium* to, 387.
STCP, see Sodium tetrachlorophenolate.
Steirochaete capsici, *Colletotrichum capsici* synonym of, 246.
Stem-end rot of banana in Australia, 40.
[Stem] galls on sugar-cane in Réunion, 328.
Stemphylium on plum in Austria, 575.
— *solani* can infect potato, *Solanum carolinense*, and *S. nigrum*, 60.
— — on chilli, eggplant, *Physalis pubescens*, *Solanum aculeatissimum*, *S. blodgettii*, *S. verbascifolium*, and tomato in U.S.A., 60.
Stereum on vine in Spain, 354.
— *frustulosum* on oak in France, 795.
— — on timber in England, 669.
— *hirsutum* can infect beech, 44; occurrence in France, 664.
— — on oak in France, 664, 796.
— — on timber in France, 664.
— *necator* on vine in Rumania, 486.
— *purpureum* on apple and apricot in S. Australia, 142.
— — on currants in Holland, 705.
— — on plum in England, 36; in S. Australia, 142.
— — on rose in England, 447.
— — on timber in France, 664.
— *rugosum* can infect beech, 44.
— *spadiceum* on oak in England, 734; in France, 796.
— *sulcatum* on *Chamaecyparis formosensis* in Japan, 605.
— — on conifers in N. America, 605.
Stictophoma acicola on pine, conidial formation in, 790; *Sphaeronema acicola* renamed, 790.
Stigmas, fungi found on, in Italy, 449.
Stilbella on rose in Trinidad, 447.
Stilbum cinnabarinum on fig in U.S.A., 456.
Stipella vigilans on Simulid larvae in Alpine waters, 512.
Stizolobium pruriens, see *Mucuna pruriens*.
Stone, bacterial decay of, in England, 645.
Strawberry (*Fragaria vesca*), *Actinomyces* on, in U.S.A., 268.
—, *Botrytis cinerea* on, in U.S.A., 102.
—, *Colletotrichum fragariae* on, in U.S.A., 495.
—, *Corticium solani* on, in France, 489.
—, *Diplocarpon earliana* on, in U.S.A., 679.
— diseases in U.S.A., 706.
—, dying-off of, in France, 488.
—, *Fabraea fragariae* on, in Holland, 705.
—, *Fusarium* on, in U.S.A., 680.
—, gold leaf disease of, in U.S.A., 494.
— mosaic in Holland, 705.
—, — -like disease of, in U.S.A., 204.
—, *Mycosphaerella fragariae* on, *Ascochyta fragariae* and *Ramularia tulasnei* stages of, 705; occurrence in Holland, 705; in U.S.A., 679.
—, *Phoma* on, in U.S.A., 680.
—, *Phytophthora cactorum* on, in Ireland, 266.
—, — (?) *cinnamomi* on, in Scotland, 7.
—, *Pythium* on, in France, 489; in U.S.A., 680.
—, *Rhizoctonia* on, in U.S.A., 680.
—, *Rhizopus nigricans* on, in U.S.A., 102.
—, *Sclerotium rolfsii* on, in U.S.A., 495.

[Strawberry], *Sphaerotheca humuli* on, in Holland, 705.
—, *Verticillium* on, in England, 139.
—, yellow edge of, in England, 519, 772; *Tarsonemus fragariae* in relation to, 519, 772.
Streak disease of *Coix lacryma-jobi* in Réunion, 328; transmission of, by *Aphis maidis* to sugar-cane, 328.
— — of maize in Réunion, 328; transmission of, by *Aphis maidis*, 328; by *Cicadulina mbila*, 686; by *C. zeae*, 687, 748.
— — of potato, comparison of American and European forms of, 48; note on, 648; occurrence in Belgium, 585; in Poland, 716; in U.S.A., 48; relation of, to potato rugose mosaic, 589; types of, 48.
— — of raspberry in U.S.A., 230.
— — of sugar-cane, control, 658; factors affecting, 659; intracellular bodies in, 659; occurrence in Egypt, 658, 749; in India, 659; in Réunion, 328; in S. Africa, 658; studies on, 658, 659; transmission of, by *Cicadulina mbila*, 659; from *Coix lacryma-jobi*, 328; varietal resistance to, 328, 658.
— — of tomato, aseptic production of, 540; control, 250; occurrence in Canada, 250, 540; in England, 540; in U.S.A., 79, 333; relation of, to 'healthy potato virus', 79, 333; to tobacco mosaic, 333; to tomato mosaic, 79; to virus of *Datura stramonium*, 79; study on, 250; tomato spotted wilt (?) mistaken for, 59; transmission of, by pruning, 333; by seed, 250. (See also Stripe disease of Tomato.)
'Streaking' of Swedish birch timber, 253.
Streak-like disease of sugar-cane in E. Africa, 748.
'*Streptothrix*' *chalceae* renamed *Micromonospora chalceae*, 242.
Stripe disease of maize in Cuba, 756; (?) in Tanganyika, 143; in Trinidad, 756; transmission of, by *Peregrinus maidis*, 143, 756.
(?) — — of sorghum in Trinidad, 757.
— — of tomato attributed to *Bacillus lathyri*, to a virus ('glasshouse streak'), and to mixed infection by potato mosaic and tomato mosaic (streak [q.v.]), 731; occurrence in Great Britain, 731; in Jersey, 549.
Stunt disease of dahlia in U.S.A., 697.
Sublimoform, composition of, 305.
—, determination of mercury in, 305.
Succovia balearica, *Plasmodiophora brassicae* on, in Russia, 346.
Sugar, *Aspergillus glaucus*, *Penicillium crustaceum*, and *Torula sacchari* on, causing inversion, in Czecho-Slovakia, 193.
— beet, see Beet.
Sugar-cane (*Saccharum officinale*), *Amoebosporus saccharinum* and *A. vascularum* on, in Porto Rico, 467; *Ligniera vascularum* synonym of, 467.
[Sugar-cane], *Armillaria mellea* on, in Tanganyika, 552.
—, *Bacterium albilineans* on, method of isolating, 114; occurrence in Australia, 114; in Mauritius, 553; in Queensland, 245; transmission of, by knives, 553; varietal susceptibility to, 245.
—, — *vascularum* on, in Barbados, 788; in Mauritius, 553; in Porto Rico, 326, 788; in Queensland, 787; in Réunion, 327; in St. Kitts, 57; transmission of, by knives, 553; varietal resistance to, 57, 326, 327, 787, 788.
—, banded chlorosis of, in the Argentine, 786; in New S. Wales and Queensland, 329; cold chlorosis and sectional chlorosis synonyms of, 329.
—, *Ceratostomella paradoxa* on, in Porto Rico, 114.
—, *Cercospora longipes* on, in U.S.A., 467.
—, chlorosis (non-infectious) of, in British Guiana, 10; manganese deficiency in relation to, 11.
—, chlorotic streak of, see fourth disease of.
—, cold chlorosis of, see banded chlorosis of.
—, *Colletotrichum falcatum* on, in U.S.A., 679, 724.
—, *Corticium sasakii* on, in Japan, 331.
—, *Cytospora sacchari* on, in U.S.A., 114.
—, degeneration of, effect of altitude on, 56.
— diseases, international survey of, 657.
—, dry top rot of, fungus associated with, in Porto Rico, 467.
—, dwarf disease of, in Queensland, 245.
—, false leaf scald of, see fourth disease of.
—, Fiji disease of, control, 787; factors affecting, 787; intracellular bodies in, 786; occurrence in Australia, 786; in Fiji, 786, 787; in Java, New Guinea, and the Philippines, 786; study on, 786; transmission of, by *Perkinsiella saccharicida*, 787; varietal resistance to, 787.
—, fourth disease of, chlorotic streak and pseudo-leaf scald identical with, 723; control, 245, 722; notes on, 554, 593; occurrence in Hawaii, 245, 722; in Java, 245, 593; in Mauritius, 554; in Porto Rico, 245, 723, 788; in Queensland, 245; pseudo-streak identical with, 245; varietal susceptibility to, 245, 554, 593.
—, *Fusarium* on, in Java, 724.
—, *Gibberella fujikuroi* on, stimulatory effect of, 590.
—, — *moniliformis* on, notes on, 679; occurrence in Porto Rico, 326; in Queensland, 787; in Réunion, 328; in U.S.A., 679; varietal susceptibility to, 326, 328, 787.
—, growth failure of, in Hawaii, 723.
—, *Helminthosporium ocellum* and *H. stenospilum* on, in Hawaii, 722.
—, 'kalimati' disease of, in Java, 425.

[Sugar-cane], leaf stipple of, in Porto Rico, 788.
—, *Leptosphaeria sacchari* on, in Tanganyika, 552.
—, *Ligniera vascularum* on, synonym of *Amoebosporus vascularum* and *A. saccharinum*, 467.
—, *Marasmius sacchari* on, in Porto Rico, 115.
—, *Melanconium sacchari* on, see *Pleocyta sacchari* on.
— mosaic, breeding against, 113, 326, 394; control, 56, 114, 326, 327, 463, 722; effect of, on germination, 192; on yield, 192, 266, 327; factors affecting, 56; legislation against, in Kenya, 9; losses caused by, 463, 679; method of inoculation with, 660, 722; occurrence in the Argentine, 463, 594, 786; in Barbados, 788; in Egypt, 749; in Hawaii, 113, 722; in India, 192, 266, 659; in Kenya, 9; in the Philippines, 245; in Porto Rico, 113, 326, 327, 394; in Queensland, 787; in Réunion, 327; in Uganda, 422; in U.S.A., 660, 679, 786; prolonged incubation in, 327; properties of virus of, 660, 722; studies on, 245, 660; transmission of, by knives, 114; types of, 245; varietal resistance to, 113, 114, 245, 326, 327, 394, 422, 463, 679, 786, 787.
—, mottled stripe of, in Porto Rico, 788.
— mycorrhiza, role of, in preventing degeneration, 394, 395.
—, 'nodal stalk rot' of, in Hawaii, 723.
—, Pahala blight of, in Porto Rico, 788.
—, *Phytomonas rubrilineans* on, control, 245; occurrence in India, 551; in Japan, 555; in Queensland, 245; study on, 555; varietal resistance to, 555.
—, *Pleocyta sacchari* on, in Porto Rico, 246; in Tanganyika, 552; *Melanconium sacchari* synonym of, 246.
—, 'polvillo' of, in the Argentine, 463.
—, pseudo-leaf scald and pseudo-streak of, see fourth disease of.
—, *Pythium* (?) *aphanidermatum* on, in Hawaii, 723.
—, — *arrhenomanes* on, in U.S.A., antagonism of Actinomycetes to, 679.
—, — *graminicolum* on, in Porto Rico, 246.
—, root rot of, in Brazil, 57; in Hawaii, 723.
—, *Sclerospora sacchari* on, in Queensland, 787.
—, sectional chlorosis of, see banded chlorosis of.
—, sereh disease of, decline of, in Java, 57; occurrence in Ceylon, 77; varietal resistance to, 57.
—, stalk necrosis of, in Hawaii, 723.
—, stem galls on, in Réunion, 328.
— streak, control, 658; factors affecting, 659; intracellular bodies in, 659; occurrence in Egypt, 658, 749; in India, 659; in Réunion, 328; in S. Africa, 658; studies on, 658, 659; transmission of, by *Cicadulina mbila*, 659; from *Coix lacryma-jobi*, 328; varietal susceptibility to, 328, 658.
[Sugar-cane, streak]-like disease of, in E. Africa, 748.
—, top rot of, in Queensland, 787.
—, twisted top of, in Réunion, 328.
—, *Ustilago scitaminea* on, in Brazil and (?) British Guiana, 723; in China, 724; in N. America and Trinidad, 723.
—, white striping of, in the Argentine, 786.
—, wilting of the 'rajoengan' of, in Java, 593.
—, yellowing (? nitrogen deficiency) of, in India, 535.
Sulfurator sulphur vaporization apparatus, 123, 175, 642, 733.
Sulphemulsol, composition and use of, as a fungicide, 522.
Sulphite lye as a spray spreader, 305, 774. (See also Lye.)
Sulpho-tone, sulphur content of, 708.
Sulphur as a constituent of manganar dust, 25.
—, atomic, use of, against *Podosphaera* (?) *oxyacanthae* and *Venturia inaequalis* on apple, 28; against *V. pirina* on pear, 300.
—, colloidal, see Colloidal sulphur.
— deficiency as the cause of tea yellows in Nyasaland, 538.
— derivatives, bactericidal value of, 775.
— dioxide, effect of, on growth of *Trichoderma lignorum*, 46.
— —, toxicity of, to *Coniophora cerebella* and *Merulius lacrymans*, 261.
— —, use of, against *Cladosporium fulvum* on tomato, 123.
— dust, cost of treatments with, 551.
— —, use of, against *Actinomyces scabies* on potato, 320, 462, 652; against *Bremia lactucae* on lettuce, 494; against *Cerotelium fici* on fig, 551; against chrysanthemum diseases, 524; against *Erysiphe cichoracearum* on cantaloupe, 615; on tobacco, 118; against *E. polygoni* on cumin, 394; on peas, 551; against *Oidium heveae* on *Hevea* rubber, 655; against *Plasmopara viticola* on vine, 8; against *Podosphaera leucotricha* on apple, 298; against *Pseudoperonospora cubensis* on cucumber, 5; against *Puccinia glumarum*, *P. graminis*, and *P. triticina* on wheat, 272; against *P. graminis* on cereals, 426; against *Sphacelotheca cruenta* and *S. sorghi* on sorghum, 552; against *Sporotrichum citri* on citrus, 166; against *Synchytrium endobioticum* on potato, 187; against *Ustilago* on oats, 212; against *Venturia inaequalis* on apple, 30.
—, effect of soil applications of, on plant pathogens, 42; on *Sclerotinia sclerotiorum* on tobacco, 730.
—, flotation, manufacture of, 577.
—, —, use of, against apple diseases, 423; against *Cladosporium carpophilum*

on peach, 11, 573; against *Coccomyces hiemalis* on cherry, 11, 573, 614; against *Diaporthe umbrina* on rose, 696; against *Diplocarpon rosae* on rose, 573, 696; against *Oidium heveae* on rubber, 323; against *Phyllosticta solitaria* on apple, 572; against plant diseases in U.S.A., 577; against *Pseudopeziza ribis* on gooseberry, 573; against *Sclerotinia americana* on peach, 573; against *Sphaerotheca pannosa* on rose, 573; against *Venturia inaequalis* on apple, 12, 30, 572, 614.

[Sulphur], flowers of, use of, against *Oidium* on avocado pear, 707.

— fumigation against *Penicillium brunoviolaceum* on cheese, 220. (See also Sulphur dioxide and Sulphur vaporization.)

—, fungicidal action of, 106.

— fungicides, analyses of American brands of, 708.

— —, legislation regulating the sale of, in French Morocco, 128.

— —, presence of micro-organisms in, 107.

—, ground, effect of, on assimilation of wheat leaves, 382.

— injury, 5, 30, 118, 123, 615.

— lime, dry mix, use of, against *Venturia pirina* on pear, 300.

— mud, use of, against *Oidium heveae* on rubber, 323.

—, precipitated, use of, against *Puccinia glumarum* on wheat, 151, 271; against *P. lolii* on oats, 272; against *P. triticina* on wheat, 151, 271.

—, production of sulphuretted hydrogen from, by fungi, 107.

— -resin spray, use of, against *Peronospora schleideni* on onion, 140.

—, sulphuretted hydrogen as the fungicidal agent of, 106.

—, toxicity of, to *Pestalozzia stellata*, 107; to *Sclerotinia americana*, 107, 710; to *Uromyces caryophyllinus*, 107.

—, use of, as a timber preservative, 740; against wood staining fungi, 669.

— vaporization against *Cladosporium fulvum* on tomato, 123, 732; against *Microsphaera polonica* on hydrangea, 175, 642; against *Oidium chrysanthemi* on chrysanthemum, 642; against *Podosphaera leucotricha* on apple, 123; against *Sphaerotheca pannosa* on rose, 175, 642, 733.

—, wettable, use of, against *Diaporthe umbrina* and *Diplocarpon rosae* on rose, 696; against *Venturia inaequalis* on apple, 30; against *V. pirina* on pear, 300.

Sulphuretted hydrogen, effect of, on growth of *Trichoderma lignorum*, 46.

— —, role of, in the fungicidal action of sulphur, 107.

Sulphuric acid, use of, against *Bacterium malvacearum* on cotton, 421, 439; against *Cercosporella herpotrichoides* on wheat, 560; against *Gloeosporium ampelophagum* on vine, 6; against moulds of hides, 94.

[Sulphuric] ether, see Ether.

Sulphurous acid, regulations for use of, in food in various countries, 695.

Sun scorch of *Hevea* rubber in Ceylon, 591, 784.

Sunflower (*Helianthus annuus*), *Bacterium tumefaciens* on, biochemistry of, 148; can infect, 81.

—, *Botrytis*, *Erysiphe cichoracearum*, and *Fusarium* on, in Russia, 571.

—, leaf spots of, in England, 571.

—, *Macrophomina phaseoli* can infect, 267.

—, mosaic of, in India, 612.

—, *Plasmopara halstedii*, *Puccinia helianthi*, *Rhizopus nodosus*, *Sclerotinia sclerotiorum*, and *Septoria helianthi* on, in Russia, 571.

—, *Sphaerotheca humuli* var. *fuliginea* on, in China, 396.

—, *Verticillium dahliae* on, in Russia, 571.

Swedes (*Brassica campestris*), *Corticium solani* on, immunization against, 262.

—, dark centre (internal breakdown) of, in U.S.A., 494.

—, *Phoma lingam* on, control, 140, 609; notes on, 140; occurrence in England, 140; in Ireland, 7, 481; in New Zealand, 134, 481, 608; overwintering of, 7; strains of, 481; studies on, 481, 608; transmission of, by *Atheta pseudocoriaria* and *Drosophila rubrostriata*, 134; by seed, 7, 140, 482; from mustard, 140.

—, *Plasmodiophora brassicae* on, control, 609, 709; occurrence in Denmark, 608, 709; in New Zealand, 608; varietal resistance to, 609.

—, reclamation disease of, in Denmark, 656.

Sweet clover disease of cattle in Canada, moulds in relation to, 699.

— —, see *Melilotus*.

Sweet peas (*Lathyrus odoratus*), clover mosaic and *Melilotus alba* mosaic can infect, 741.

— —, mosaic of, in U.S.A., 414, 741; transmission of, to bean by *Macrosiphum pisi*, 414; by sap, 414, 741.

Sweet potato (*Ipomoea batatas*), *Botryodiplodia theobromae* on, in Uganda, 422.

— —, *Ceratostomella fimbriata* on, in U.S.A., 463, 612.

— —, *Diplodia tubericola* can infect, 366.

— —, *Fusarium* and *Macrophomina phaseoli* on, in Uganda, 422.

— —, *Monilochaetes infuscans* on, control, 612; occurrence in Sierra Leone, 203; in U.S.A., 145, 612; varietal resistance to, 145.

— —, *Phyllosticta batatae* on, in Sierra Leone, 553.

— —, *Physalospora rhodina* and *P. zeicola* can infect, 366.

— —, *Pythium bulleri*, *Rhizopus nigricans*, and *R. tritici* on, in U.S.A., 671.

— —, root rot of, in U.S.A., 146.

— —, *Sclerotinia sclerotiorum* on, in U.S.A., 671.

Symphoricarpos racemosus, see Snowberry.

Syncephalastrum cinereum on cacao in England, 149.
— — on copra, lipase production by, 47.
Synchytrium endobioticum on potato, biochemistry of, 718; control, 187, 190, 322, 651, 672; factors affecting, 50, 490, 651; germination of sporangia of, 322; legislation against, in Bulgaria, 592; in Great Britain, 800; in Poland, 591; in Portugal, 127, 672; in S. Rhodesia, 464; in Switzerland, 190; note on, 75; occurrence in Austria, 51, 187; in Belgium, 51; in Czecho-Slovakia, 51, 322; in Finland, 51; in France, 51, 75, 490; in Germany, 51, 322, 578, 651; in Great Britain, Holland, Ireland, N. America, and Norway, 51; in Poland, 51, 591, 718; in Portugal, 127, 672; in S. Africa, 51; in Sweden, 51; in Switzerland, 51, 189, 678; in U.S.A., 51; studies on, 50, 322, 718; transmission of, 189; varietal resistance to, 51, 75, 190, 322, 490, 678.
Syringa vulgaris, see Lilac.

Tagetes erecta, beet curly top virus can infect, 447.
Talc, as diluent for dusts, 272, 551.
'Tambera' disease of potato in India, similarity of mite infestation to, in U.S.A., 784.
Tangerine, see Orange.
Tanytarsus, Stachylina longa on, in Alpine waters, 512.
Taphrina bussei on cacao in the Cameroons, 207.
— *cornu-cervi* on *Aspidium aristatum*, 664.
— *deformans* on peach, control, 451; notes on, 451; occurrence in Réunion, 680; in Switzerland, 451; in U.S.A., 227; varietal resistance to, 228.
— *pruni* on plum in Switzerland, 451.
Tar, use of, against *Phytophthora parasitica* on orange, 213.
— -oil, use of, as a timber preservative, 346.
—, see also Creosote, Water-gas tar.
Tarsonemus producing virus-like disease of potato in U.S.A., 784.
— *fragariae* in relation to yellow edge of strawberry in England, 519, 772.
Tavaresia, Triposporium stapeliae on, in S. Africa, 764.
Taxodium, Sclerophoma taxodii on, conidial formation in, 790.
Tea (*Thea*), *Armillaria mellea* on, in Nyasaland, 10.
—, (?) brown root rot of, in Malaya, 355.
— canker attributed to *Helopeltis bergrothi*, 332; gnarled canker suggested as a name for, 9; occurrence (?) in India, 9; in Nyasaland, 9, 332.
—, *Discosia theae* on, in Indo-China, 147.
—, *Exobasidium vexans* on, legislation against, in S. Rhodesia, 463.
—, *Fomes* (?) *noxius* on, in Ceylon and Malaya, 55; formerly determined as *F. lamaensis*, 55.
—, *Fusarium* on, in Indo-China, 147.
[Tea], *Ganoderma pseudoferreum* on, in Java, 248.
—, gnarled canker of, see canker of.
—, *Helicobasidium* (?) *compactum* on, in Nyasaland, 9.
—, *Irpex destruens* on, tests of wound dressings against, 597.
—, *Macrophomina phaseoli* on, note on, 10, 538; occurrence in Nyasaland, 10, 538; in Tanganyika, 201.
—, *Massaria theicola* on, in Indo-China, 147.
—, *Phoma camelliae* on, in Malaya, 355.
—, *Rosellinia arcuata* and *R. bunodes* on, in Java and Sumatra, 425.
—, *Septobasidium lanatum* on, in Cochin-China, 331.
—, *Tryblidiella leprieuri* on, in India, 790; *Diplodia* stage of, 790.
—, witches' broom of, in Ceylon, 597.
—, wood-rots of, in Ceylon, 597.
— yellows (sulphur deficiency disease) in Nyasaland, 537; (?) in Tanganyika, 201.
Tea cider, use of *Bacterium xylinum* and *Saccharomycodes ludwigii* for preparation of, in Ceylon, 597, 661; in Java, 249.
— vinegar, preparation of, in Ceylon, 661.
Tellers' copper-lime dust, use of, against *Venturia inaequalis* on apple, 31.
Tellurium, toxicity of, to fungus spores, 106.
— compounds, decomposition of, by *Penicillium brevicaule*, 714.
Tephrosia candida, Rosellinia bunodes on, in Java, 425.
Termites, *Penicillium, Trichoderma*, and other fungi on, in U.S.A., 460.
Terpineol, see Alpha-terpineol.
Tetramyxa, taxonomic notes on, 468.
Thamnidium aurantiacum on bread in Russia, 625.
Thea, see Tea.
— *oleosa*, (?) *Meliola camelliae* on, in China, 396.
Thecopsora minima on *Rhododendron ponticum* in U.S.A., 696.
— *myrtillina* on *Vaccinium uliginosum* in Japan, 726.
— *vacciniorum* on *Vaccinium vitis-idaea* in Japan, 726.
Theobroma cacao, see Cacao.
Thielavia basicola, antagonism of bacteria to, 109.
— — on bean in U.S.A., 71.
— — on begonia in Germany, 448.
— — on tobacco causing black root, see *Thielaviopsis basicola*.
Thielaviopsis basicola on lilac in U.S.A., 355.
— — on peas in France, 489.
— — on peony in U.S.A., 355.
— — on *Primula obconica* in Holland, 513.
— — on tobacco in U.S.A., 146, 493.
— *paradoxa*, see *Ceratostomella paradoxa*.
Thiourea, toxicity of, to fungi, 304.
Thread blights (Marasmioid) of nutmeg in Java, 425.

Thrips as the cause of 'plume' disease of peach in Italy, 229.
Thrips tabaci, transmission of *Solanum capsicastrum* ring spot by, in Great Britain, 59; of tomato spotted wilt by, in Great Britain, 59, 730; of yellow spot of pineapple by, in Hawaii, 304.
Thuja occidentalis, (?) *Phomopsis juniperovora* on, in U.S.A., 251.
— *plicata*, *Elaphomyces* as mycorrhizal symbiont of, in Scotland, 529.
Thujopsis dolabrata, *Caeoma deformans* on, 664.
— —, resistance of timber of, to *Poria vaporaria*, 481.
Thurberia thespesioides, intumescences on, in U.S.A., 529.
Thymol, toxicity of, to ringworm fungi, 509.
Tibalene NAM, use of, as a spreader, 75.
Tilia, see Lime tree.
Tillantin, absence of mercury in seed-grain treated with, 152.
—, adherence of, to seed-grain, 430.
—, composition of, 306.
— dust, use of, against *Helminthosporium gramineum* on barley, 162.
— B, use of, against *Urocystis tritici* on wheat, 363.
— R, determination of mercury in, 306.
— —, use of, against *Alternaria radicina* on carrot, 72.
Tillantina, toxicity of, to *Corticium solani*, 214.
Tilletia caries can infect rye, 683.
— — on wheat, basidial apparatus of, 777; breeding against, 18, 204; chemical composition of spores of, 277, 585; control, 16, 17, 84, 152, 153, 155, 161, 279, 492, 496, 558, 560, 616, 682, 683; damages for negligence in control of, 161; effect of date of sowing on, 429, 558; of, on host, 209, 276, 558; on susceptibility to *Puccinia glumarum*, 276; on yield, 156; of host on virulence of, 153; estimation of degree of infection by, 154; factors affecting, 155, 429, 492, 558, 560; genetics of resistance to, 84, 85, 428; homo- and heterothallic stages of, 777; hybridization of, with *T. foetens*, 277; method of inoculation with, 777; occurrence in the Argentine, 682; in Australia, 275; in Austria, 16, 17, 153; in Canada, 428, 751, 777; in the Caucasus, 560; in France, 276, 277, 429, 558, 682; in Germany, 84, 152, 161, 209, 279; in Italy, 209, 558; in Lithuania, 492; in New S. Wales, 85; in New Zealand, 496; in Russia, 616; in Siberia, 154, 155; (?) in Sweden, 618; in U.S.A., 18, 84, 155, 156, 204, 275, 277, 428, 618; overwintering of, 751; physiologic forms of, 17, 155, 156, 204, 428, 618, 682; relation of, to speltoid character, 618; strains of, 429; studies on, 84, 85, 154, 276, 428, 492, 558, 618, 777; varietal resistance to, 17, 85, 156, 204, 275, 428, 429, 492, 618.
[*Tilletia caries*], *T. lolii* may be a form of, 156.
— *foetens* can infect *Lolium multiflorum* and *L. perenne*, 156; rye, 683.
— — on wheat, breeding against, 18, 204; control, 16, 17, 84, 152, 153, 161, 279, 496. 558, 559, 560, 616, 644, 683; damages for negligence in control of, 161; effect of, on host, 209, 558; of host on virulence of, 154; of sowing date on, 424, 429, 558, 559; of X-rays on. 644; estimation of the degree of infection by, 154; factors affecting, 424, 429, 558, 559, 560; genetics of resistance to, 428, 500; hybridization of, with *T. caries*, 277; method of inoculation with, 777; occurrence in the Argentine, 682; in Australia, 275; in Austria, 16, 17, 682; in Canada, 428; in the Caucasus, 559, 560; in France, 277, 558; in Germany, 84, 152, 161, 279; in Italy, 209, 558; in New Zealand, 496; in Russia, 616; in Siberia, 154; in Tunis, 153; in U.S.A., 18, 154, 204, 275, 277, 424, 429, 500, 617, 644; physiologic forms of, 17, 156, 204, 429, 618, 682; soil infection by, 429; studies on, 154, 428, 500, 558, 618; trimethylamine in spores of, 277; varietal resistance to, 17, 204, 275, 428, 559, 618; viability of, 424.
— *holci* on *Holcus lanatus* in Denmark, 294.
— *lolii* may be a form of *T. caries*, 156.
— *narduri* on *Festuca pou* in Morocco, 469.
— *pančičii* can infect barley, 559; occurrence in the Caucasus, 560.
— *secalis* on rye in Rumania, 549; in Russia, 616.
Timber, *Acrostalagmus* and *Alternaria* on pulpwood of, in U.S.A., 545.
—, *Armillaria mellea* on, action of, 343.
—, *Aspergillus fumigatus* on pulpwood of, in U.S.A., 545.
—, blue stain of, in Russia, 257. (See also *Ceratostomella* on.)
—, *Cadophora fastigiata* on pulpwood of, in Norway, 69.
—, *Ceratostoma rugosa* on, in U.S.A., 669.
—, *Ceratostomella* on, control, 344, 345, 411, 668; factors affecting, 344; losses caused by, 345; occurrence in Canada, 345, 545; in U.S.A., 344, 411, 668; study on, 344.
—, — *fagi* on, 665; in Germany, 195.
—, — *piceae* and *C. pini* on, action of, 195.
—, — *pluriannulata* on, in U.S.A., 669.
—, — *stenoceras* on pulpwood of, in Norway, 69.
—, *Chaetomium* on pulpwood of, in U.S.A., 545.
—, *Cladosporium* on, in U.S.A., 545, 669.
—, — *herbarum* on pulpwood of, in Norway, 69.
—, *Coniophora cerebella* on, control, 260, 261, 262, 345; factors affecting, 260, 261; identification of mycelium of, 259; mixed inoculations with, 260;

occurrence (?) in Australia, 345; in Russia, 258, 259, 260, 261; production of water by, from cellulose, 258; studies on, 258, 259.
[Timber] decay in Canada, losses caused by, 345, 545.
—, *Discula pinicola* var. *mammosa* and *Epicoccum purpurascens* on pulpwood of, in Norway, 69.
—, *Fomes annosus* on, in U.S.A., 740.
—, — *cryptarum* on, in England, 669.
—, — *fomentarius* on, action of, 343.
—, — *pinicola* on, action of, 261.
—, fungi destroying, in Canada, 344; factors affecting, in Switzerland, 132; identification of, by microscopic characters, 340; type cultures of, in England, 342.
—, *Ganoderma applanatum* on, action of, 343.
—, *Graphium*, *Hormiscium*, and *Hormodendron* on, in U.S.A., 669.
—, *Hormonema pullulans* on pulpwood of, in Norway, 69.
—, *Lentinus lepideus* on, in England, 669; in U.S.A., 740.
—, — *tigrinus* on, factors affecting, 411.
—, *Lenzites sepiaria* on, factors affecting, 411; occurrence in U.S.A., 740.
—, *Leptoporus undatus* on, in Czecho-Slovakia, 410; *Polyporus undatus* renamed, 410; synonymy of, 410.
—, *Merulius lacrymans* on, control, 68, 260, 261, 262; factors affecting, 260, 261, 739; identification of mycelium of, 259; mixed inoculations with, 260; notes on, 68; occurrence in England, 68; in Russia, 258, 259, 260, 261; in Scotland, 739; production of water by, 258, 739; studies on, 258, 259, 739.
—, *Monilia* on pulpwood of, in U.S.A., 545, 607.
—, moulding of, in U.S.A., 344, 411.
—, mycelium B 7, *Myxotrichum carminoparum*, *Oidiodendron fuscum*, *O. nigrum*, and *O. rhodogenum* on pulpwood of, in Norway, 69.
—, *Oidium* on pulpwood of, in U.S.A., 545, 607.
—, *Paxillus panuoides* on, action of, 68.
—, *Penicillium* on pulpwood of, in U.S.A., 545.
—, *Pleurotus ostreatus* and *Polyporus adustus* on, action of, 343.
—, *Polyporus undatus* on, see *Leptoporus undatus* on.
—, *Polystictus abietinus* on, action of, 343.
—, — *hirsutus* on, action of, 740.
—, — *versicolor* on, factors affecting, 411.
—, *Poria vaporaria* on, identification of mycelium of, 259; occurrence in Russia, 258; specific resistance to, 481.
— preservation by a Canadian method (for poles), 123; by a new Finnish method, 411; by the Burnettizing process, 70; by the Card and Lowry processes, 670; by the Rueping process, 70, 670; by the tank process, 342, 740.
[Timber preservation], cost of, 346.
— — in Australia, 345; in Canada, 342, 344; in England, 342; in Mexico and the Philippines, 344; in U.S.A., 1, 344, 669.
— —, use of ammonia for, 411; of asphaltic or residue petroleum for, 70; of arsenic compounds for, 385; of copper sulphate for, 123; of creosote for, 70, 123, 342, 345; of dinitrophenol for, 342; of formaldehyde and furfural for, 411; of phenol for, 411; of tar oil for, 345; of zinc chloride for, 70, 123.
— preservatives, estimation of, in treated timber, 133.
—, *Stereum frustulosum* on, in England, 669.
—, — *hirsutum* on, in France, 664.
—, — *purpureum* on, in France, 664.
—, 'streaking' of Swedish birch, 253.
—, *Trametes pini* on, action of, 343, 344, 739; occurrence in Canada, 344.
—, *Trichoderma* on pulpwood of, in U.S.A., 545.
—, — *lignorum* in pulp mills for, in Norway, 69.
—, *Xylaria polymorpha* on, formation of black lines by, 544.
Tip rot of banana in Trinidad, 382.
Tipburn of lettuce in U.S.A., 196, 611.
Titaeospora andropogonis on sorghum in China, 248; *Ramulispora andropogonis* synonym of, 248.
Tobacco (*Nicotiana*), *Alternaria longipes* on, notes on, 476, 748; occurrence in Rhodesia, 476, 748, 794
—, — *tabacina* on, in Rhodesia, now referred to *A. longipes* Tisdale & Wadkins, 748.
—, *Aspergillus* on, in U.S.A., 145.
—, *Bacillus aroideae* on, in Sumatra, 332.
—, *Bacterium angulatum* on, in Rhodesia, 775.
—, — *melleum* on, in Rumania, 791.
—, — *pseudozoogloeae* on, in Sumatra, 471.
—, — *solanacearum* on, control, 793; factors affecting, 145; notes on, 118, 333, 470; occurrence in Java, 118; in Malaya, 355; in Porto Rico, 793; in Sumatra, 333, 470; in U.S.A., 145; study on, 793; varietal resistance to, 793.
—, — *tabacum* on, control, 475, 491; factors affecting, 490, 600, 775; method of inoculation with, 600; occurrence (?) in Belgium, 7; in Canada, 475; in France, 490; in Germany, 600; in Rhodesia, 775; in Switzerland, 678; in U.S.A., 401; production of toxin by, 401; reaction of leaves to, 476; varietal resistance to, 600.
—, — *tumefaciens* can infect, 516.
—, brown root rot of, in U.S.A., 477, 493; calcium in relation to, 477.
— canker in France, a form of ring spot, 489.
—, *Cercospora nicotianae* on, control, 118, 333, 476; factors affecting, 794; notes on, 11, 794; occurrence in China,

395; in Italian Somaliland, 247; in Java, 118; in Malaya, 355; in Rhodesia, 476, 794; in Sumatra, 333; in Tanganyika, 201; (?) in U.S.A., 11; varietal susceptibility to, 333.
[Tobacco] crinkle in Rumania, 791.
—, cucumber mosaic on, effect of host on virus of, 108; occurrence in U.S.A., 108, 205, 539.
—, 'daon lidah' disease of, in Sumatra, 71; transmission of, from and to *Physalis angulata*, 471.
— diseases, legislation against, in Rhodesia, 736; occurrence in Rumania, 791; in Sumatra, 662; in U.S.A., 117; pathological modifications caused by, 476.
—, *Erysiphe cichoracearum* on, control, 118; factors affecting, 118; occurrence in Java, 118; in Réunion, 680; in Tanganyika, 201.
— etch, note on, 205.
—, 'female sterility virus' of, in Russia, 600, 728; transmission of, to *Datura stramonium*, *Nicotiana glauca*, *N. langsdorffii*, *N. rustica*, and tomato, 599.
— frenching in U.S.A., 205.
—, *Fusarium* on, in U.S.A., 145.
—, 'gilah' disease of, in Sumatra, 471. (See also leaf curl of.)
—, houseburn disease of, in U.S.A., 118.
—, Hy. II, Hy. III, and Hy. IV viruses of *Hyoscyamus niger* can infect, 243.
—, 'korah' disease of, in Sumatra, 471.
— leaf curl, anatomy of, 474; breeding against, 748; crinkle and curl synonyms of, 58; legislation against, in S. Rhodesia, 736; occurrence (?) in the Belgian Congo, 143; in E. Africa, 791; in Java, 474; in Rumania, 791; in S. Africa, 143; in S. Rhodesia, 58, 791; in Tanganyika, 143; in the Transvaal, 791; in Zanzibar, 143; studies on, 58, 474; survival of, on volunteer plants, 58; transmission of, by Aleyrodidae, 58, 791; by *Bemisia*, 143, 475; types of, 474.
—, *Monilia cerebriforme*, *M. macrospora*, *M. medvaecensis*, and *M. microspora* on, 662.
— mosaic, attempted immunization against, 314, 398; control, 145, 205, 540; cytology of, 581, 728; factors affecting, 108, 540, 581, 792; histology of, 119, 538, 727; incubation period of, 119; local lesions of, 526; malformations caused by, 581; nature of virus of, 314; of resistance of certain plants to, 313; notes on, 145, 205, 539; occurrence in Germany, 313; in Italy, 540; in Japan, 43, 598; in Java, 118; in Rumania, 580; in Russia, 600, 728; in S. Rhodesia, 476; in U.S.A., 108, 118, 119, 145, 205, 332, 333, 398, 461, 538, 539, 648; properties of virus of, 108, 234, 309, 461, 525, 598; purification of virus of, 332, 599, 648; quantitative study of, 398, 526; relation of, to 'healthy potato virus', 318; to tomato mosaic, 731; to tomato streak, 333; serologic studies on, 43, 314, 398; shape of virus particles of, 234, 401, 525; size of virus particles of, 309; spread of virus of, in host tissues, 118, 598, 791; sterility caused by, 600, 728; studies on, 43, 118, 119, 313, 538, 581, 598, 648, 727, 791; symptoms of, on other hosts, 119; transmission of, to *Datura stramonium*, 120, 313; to *Nicotiana glutinosa*, 120, 313, 526; to *N. paniculata*, *N. tabacum* var. *angustifolia*, and *N. tomentosa*, 538; to tomato, 120, 313, 333, 793; to various hosts, 119, 120; types of, 118, 314; virus of, affecting petunia, *Solanum nigrum*, and other hosts in U.S.A., 333.
[Tobacco], *Peronospora* on, in Queensland, 201.
—, — *hyoscyami* on, control, 146, 402; losses caused by, 249; notes on, 249; occurrence in U.S.A., 146, 249, 402, 538, 679, 732.
—, Phycomycete on, in U.S.A., 145.
—, *Phyllosticta* (?, *nicotiana* on, in Rhodesia, 476.
—, *Phytophthora parasitica nicotianae* on, breeding against, 146; control, 145, 398, 401; factors affecting, 118, 554; legislation against, in Mauritius, 554; notes on, 471; occurrence in Java, 118; in Mauritius, 554; in Porto Rico, 398, 401; in Sumatra, 471; in U.S.A., 145, 146, 793; study on, 793; toxic action of, 793; varietal resistance to, 146.
—, potato mosaic can infect, 586.
—, — necrotic virus can infect, 388.
—, *Pythium* on, in Sumatra, 471.
—, — *de Baryanum* on, in Porto Rico, 398, 401.
— ring spot, acquired immunity from, 120; canker formation attributed to, 489; control, 472; effect of host on virus of, 108; of, on pollen development, 472; factors affecting, 120, 472; intracellular bodies in, 473; notes on, 489; occurrence in France, 489; in Rumania, 580; in U.S.A., 108, 120, 472, 473, 673; properties of virus of, 108, 473; relation of, to potato aucuba mosaic, 472; strains of, 471; studies on, 120, 471; transmission of, by seed, 472; to bean and cowpea, 121; to *Nicotiana* spp. and *Phaseolus lunatus*, 121; to spinach, 674; virus of, affecting potato and *Solanum carolinense* in U.S.A., 472.
—, root diseases of seedlings of, in U.S.A., 356.
—, Rotterdam B disease of, in Sumatra, 471.
—, sand drown of, in U.S.A., 146.
—, *Sclerotinia sclerotiorum* on, in Germany, 729; *Trichothecium roseum* parasitizing, 729.
—, speck spot of, in U.S.A., 205.
—, spot necrosis of, attempted immunization against, 398; occurrence in Rumania, 580; in U.S.A., 108, 398; properties of virus of, 108; relation of, to mottle, 108.

[Tobacco], *Thielavia basicola* on, see *Thielaviopsis basicola* on.
—, *Thielaviopsis basicola* on, in U.S.A., 146, 493.
—, tomato aucuba mosaic on, cytology of, 525; intracellular bodies in, 526.
—, — mosaic can infect, 402.
—, — spotted wilt virus can infect, 59, 526; occurrence in S. Australia, 142.
—, *Tylenchus pratensis* on, in U.S.A., 145.
— veinbanding, note on, 205; occurrence in Rumania, 580; in U.S.A., 205, 588; properties of virus of, 588; relation of, to potato crinkle A, 588; to potato rugose mosaic, 588; to potato virus A, 717; to potato virus Y, 717; transmission of, by *Macrosiphum gei* and *Myzus persicae*, 588; by sap, 588; from potato, 588; to *Nicandra physaloides*, *Nicotiana glutinosa*, *N. rustica*, *Physalis pubescens*, *Solanum nigrum*, and tomato, 588; virus of, on potato in Holland, 589; in U.S.A., 205, 588.
—, virus disease of, in U.S.A., 474; transmission of, to cucumber, delphinium, and tomato, 474.
—, virus diseases of, in Rumania, 791.
—, virus X on, protective inoculation against, 581.
Toluene, toxicity of, to *Sclerotinia americana*, 229.
Tomato (*Lycopersicum esculentum*), *Alternaria solani* on, notes on, 267, 495, 678; occurrence in Canada, 678; in Trinidad, 121; in U.S.A., 249, 267, 495.
—, — *tomato* on, in Germany, 662; in U.S.A., 121.
—, *Aplanobacter michiganense* on, control, 267, 663; occurrence in Germany, 662; in U.S.A., 249, 267, 424; overwintering of, 424; variation in, 81.
—, aucuba mosaic of, artificial production of intracellular bodies of, 526; cytology of, 525; effect of, on host, 731; multiplication of virus of, 528; occurrence in England, 731; particulate nature of virus of, 528; transmission of, to *Nicotiana glutinosa*, 527; to *Solanum nodiflorum* and tobacco, 525.
—, *Bacillus aroideae* on, (?) in Bermuda, 421; in Trinidad, 121; in U.S.A., 121.
—, — *carotovorus* on, (?) in Bermuda, 421; in U.S.A., 121.
—, — *lathyri* on, relation of, to stripe, 540, 731.
—, *Bacterium solanacearum* on, note on, 793; occurrence in Ceylon, 77; in Morocco, 488; in Porto Rico, 793.
—, — *tomato* on, in Japan, 555.
—, — *tumefaciens* can infect, 516, 680, 699; biochemistry of, 148; polyploidy in a shoot from tumour caused by, 59.
—, — *vesicatorium* on, 555.
—, beet curly top can infect, 349, 748.
—, blossom-end rot of, control, 733; factors affecting, 459, 733; occurrence in New Zealand, 733; in U.S.A., 121, 459.
—, blotchy ripening of, see potash deficiency of.
[Tomato], *Botrytis cinerea* on, in Germany, 662.
—, *Cladosporium fulvum* on, *Botrytis* parasitizing, 194, 713; control, 123, 194, 233, 403, 732; factors affecting, 403; genetics of resistance to, 250; note on, 179; occurrence in England, 403; in Germany, 123, 194, 233, 250, 578, 732; in Jersey, 549; in New Zealand, 122; in U.S.A., 249; study on, 250; varietal resistance to, 249, 251.
—, *Colletotrichum phomoides* on, in U.S.A., 121.
—, *Corticium solani* on, control, 643; occurrence in Bermuda, 421; in U.S.A., 121, 643.
—, cucumber mosaic affecting, in Russia, 778.
— curly top, notes on, 424; occurrence in U.S.A., 196, 424, 748; physiological effects of, 424; transmission of, by *Eutettix tenella*, 748; from beet, 748.
—, *Didymella lycopersici* on, breeding against, 477; control, 223, 663; necrotic effect of, on phloem, 44; notes on, 662; occurrence in Germany, 233, 477, 662, 663; in Jersey, 549; spread of, from tomato sticks, 663; toxic action of, 315; varietal resistance to, 477.
—, disease of, attributed to excessive manuring, in Canada, 678.
—, fungal rots of, in cold storage, in Trinidad, 794.
—, *Fusarium* on, in Trinidad, 121, 794.
—, — *acuminatum* on, in Germany, 662.
—, — *lycopersici* on, breeding against, 12; control, 403, 644, 732; effect of, on transpiration, 714; effect of root extracts on enzymes of, 79; losses caused by, 403; occurrence in New S. Wales, 732; in New Zealand, 403; in S. Africa, 142; in U.S.A., 12, 79, 121, 206, 644; studies on, 714; toxic action of, 315, 387, 714; varietal resistance to, 12, 142, 206, 732.
—, — *oxysporum* on, in Greece, 469.
—, glasshouse streak of, in Great Britain, 731; relation of, to tomato mosaic and tomato stripe, 781.
—, *Glomerella cingulata* on, in Trinidad, 121.
—, Hy. III and Hy. IV viruses of *Hyoscyamus niger* can infect, 243.
— mosaic, control, 250, 541; effect of, on physiology of host, 402, 778; notes on, 731; occurrence in Canada, 250, 540; in Egypt, 749; in Great Britain, 731; in Rumania, 580; in Russia, 778; in U.S.A., 79, 206, 402; properties of virus of, 402; relation of, to 'healthy potato virus', 318; to tobacco mosaic, 731; to tomato glasshouse streak, 731; to tomato streak (stripe), 79, 402, 731; tomato spotted wilt (?) mistaken for, 59; transmission of, by seed, 250, 540; to chilli, 402; to *Nicotiana affinis*, *N. sanderae*, *N. sylvestris*, petunia, and *Salpiglossis sinuata*, 206;

to *Solanum dulcamara*, *S. nigrum*, and tobacco, 402; types of, 402.
[Tomato], *Nematospora coryli* on, in U.S.A., 594.
—, — *gossypii* can infect, 595.
—, *Oidiopsis* on, in Cyprus, 747.
—, *Peronospora hyoscyami* on, in U.S.A., 732.
—, phloem necrosis in, 43.
—, *Phoma destructiva* can infect, 24; note on, 794; occurrence in Germany, 662; in Trinidad, 121, 794; in U.S.A., 121; *Phyllosticta hedericola* identical with, 24.
—, — *lingam* can infect, 482.
—, *Phomopsis* on, in Trinidad, 121.
—, *Phytophthora infestans* on, factors affecting, 249; notes on, 249; occurrence in France, 75; in Germany, 662; in Jersey, 549; in U.S.A., 249.
—, — *paeoniae* can infect, 176.
—, — *parasitica* on, in U.S.A., 121.
—, potash deficiency in, in Jersey, 549; in U.S.A., 663.
—, potato calico can infect, 615.
—, — necrotic virus can infect, 388.
—, psyllid yellows of, in U.S.A., 424; transmitted by *Paratrioza cockerelli*, 424.
—, *Pythium ultimum* on, in U.S.A., 122, 232, 643.
—, *Rhizopus nigricans* on, in U.S.A., 121.
—, *Sclerotinia sclerotiorum* on, control, 193; factors affecting, 780; notes on, 421; occurrence in Bermuda, 421; in New Zealand, 193; study on, 780.
—, *Septoria lycopersici* on, control, 11, 206; notes on, 206, 267; occurrence in U.S.A., 11, 206, 233, 267; varietal susceptibility to, 11.
—, spotted wilt of, control, 731; host range of, 59, 730; note on, 142; occurrence in Australia, 59; in the British Isles, 59, 541, 730; in S. Australia, 142; quantitative study of, 526; ring spot of *Solanum capsicastrum* identical with, 59; studies on, 59, 730; transmission of, by pruning, 730; by *Thrips tabaci*, 59, 730; to tobacco, 59, 526; virus of, affecting tobacco in S. Australia, 142.
—, *Stemphylium solani* on, in U.S.A., 60.
— streak, aseptic production of, 540; control, 250; occurrence in Canada, 250, 540; in England, 540; in U.S.A., 79, 333; relation of, to 'healthy potato virus', 79, 333; to tobacco mosaic, 333; to tomato mosaic, 79; to virus of *Datura stramonium*, 79; study on, 250; tomato spotted wilt (?) mistaken for, 59; transmission of, by pruning, 333; by seed, 250. (See also Tomato stripe.)
— stripe, attributed to *Bacillus lathyri*, a virus ('glasshouse streak'), and to mixed infection by potato mosaic and tomato mosaic ('streak' [q.v.]), 731; occurrence in Great Britain, 731; in Jersey, 549.
—, tobacco 'female sterility virus' can infect, 599.
[Tomato, tobacco] mosaic infecting, 120, 313, 333; transmission of, by high pressure guttation water, 793.
—, — veinbanding can infect, 588.
—, — virus disease in U.S.A. can infect, 474.
—, *Verticillium albo-atrum* on, control, 403; factors affecting, 117; notes on, 117, 403, 470; occurrence in Germany, 117; in New Zealand, 403, 719; strains of, 719; study on, 719.
—, — *ovatum* on, in U.S.A., 249.
—, virus diseases of, in Germany, 477.
— wastage in cold storage in Trinidad, 121.
— yellows, see curly top of.
Top rot of sugar-cane in Queensland, 787.
Torula in soil in Czecho-Slovakia, 535.
— on banana, 39.
— on dates in U.S.A., 379.
— on man in U.S.A., 94, 629.
— on prunes in U.S.A., 380.
— *ligniperda* on birch in Canada, 123.
— *nigra* in milk in U.S.A., 513.
— *sacchari* on man, 218.
— — on sugar in Czecho-Slovakia, 193.
— —, *Oospora d'agatae* synonym of, 213.
— *variabilis* on banana, 39.
Torulopsis on plum in Austria, 575.
'Toxicity surfaces', use of, in tests of fungicides, 710.
Trametes pini on pine in Canada, 123.
— — on *Pseudotsuga taxifolia* in Poland, 739.
— — on timber, action of, 343, 344, 739; occurrence in Canada, 344.
— *radiciperda* preferred as a name for *Fomes annosus*, 738.
— *serpens*, hyphal pegs in, 341.
Trichocaulon, *Triposporium stapeliae* on, in S. Africa, 764.
Trichoderma, effect of excretions of, on growth of wheat, 85.
(?) — on mushrooms in U.S.A., 352.
— on pulpwood in U.S.A., 545.
— on termites in U.S.A., 461.
— *album* in soil in China, 656.
— *koningi*, decomposition of rape cake by, 593.
— — in soil in China, 656; in Czecho-Slovakia, 535.
— *lignorum*, action of volatile substances and gases on, 46.
— —, antagonism of, to *Fusarium culmorum* and *Helminthosporium sativum*, 534.
— —, beneficial effect of, on peas, 535.
— — in the air of wood pulp mills in Norway, 69.
— — in soil in China, 534, 656; in Czecho-Slovakia, 535.
— — parasitizing *Corticium solani*, *Phytophthora parasitica*, *Pythium*, *Rhizopus*, and *Sclerotium rolfsii*, 192.
Trichophyton, faviform growth of, 172.
— on man in Canada, 23.
—, toxicity of dyes to, 371.
— *acuminatum* on man in Algeria, 510.
— *album* (?) on cattle and man in Canada, 219.

[*Trichophyton*] *asteroides* synonym of *T. mentagrophytes*, 694.
— *ceylonense* on man in Persia, 630.
— *coccineum* regarded as a variety of *Sabouraudites ruber*, 443.
— *crateriforme* on man in U.S.A., 694; *T. fumatum* formerly identified as, 510.
— *denticulatum* synonym of *T. niveum*, 695.
— *felineum*, *T. niveum* preferred as a name for, 695.
— *fumatum* on man in Algeria, 510; formerly identified with *T. crateriforme*, 510.
— *glabrum* on man in Algeria, 510; in Japan, 94.
— *gourvili* on man in French W. Africa, 511.
— *granulosum* on man in U.S.A., 291; toxicity of pine oils to, 291.
— — synonym of *T. mentagrophytes*, 694.
— *gypseum* on man, effect of irradiation on, 443; effect of, on reaction of medium, 568; occurrence in Canada, 693; in U.S.A., 630; sporulation of, 693.
— *interdigitale*, see *T. mentagrophytes*.
— *lacticolor* synonym of *T. mentagrophytes*, 695.
— *megnini* on man in S. America, 173; *T. rosaceum* synonym of, 173.
— *mentagrophytes* on man, control, 509; factors affecting, 509, 629; occurrence in Japan, 94; in U.S.A., 291, 508, 509, 629; reference of, to *Ctenomyces* not accepted, 694; synonymy of, 695; toxicity of alcohol to, 509; of pine oils to, 291; of sodium hypochlorite to, 629; transmission of, to animals, 694.
— *niveum*, *T. denticulatum*, *T. pedis*, and *T. radians* synonyms of, 695.
— *pedis* synonym of *T. niveum*, 695.
— *purpureum* on man in U.S.A., 509; toxicity of pine oils to, 291.
— *radians* synonym of *T. niveum*, 695.
— *radiolatum*, medium for cultivation of, 443.
— — synonym of *T. mentagrophytes*, 694.
— *rosaceum* on man in U.S.A., 509, 629.
— — synonym of *T. megnini*, 173.
— *rubidum* on man in the Cameroons, 569.
— *rubrum* on man in U.S.A., 509, 630. (See also *Sabouraudites ruber*.)
— *violaceum* on man, effect of grenz rays on, 694; occurrence in Algeria, 510; in Portugal, 442; in U.S.A., 694; toxicity of dyes to, 371; trichophytin test for, 630.
Trichosanthes anguina, beet curly top virus can infect, 447.
Trichosporum beigeli on man in Central Africa, Europe, Japan, and Nigeria, 172.
— *giganteum* on man (?) in Costa Rica, 444.
— *hortai* on man in Colombia, 444; in Brazil and Paraguay, 445.
Trichothecium candidum on vine in Rumania, 487.
[*Trichothecium*] *roseum*, antagonism of bacteria to, 109.
— — on apple in England, 32.
— — on banana, 39.
— — on coco-nut (copra) in Malaya, 355.
— — parasitizing *Sclerotinia sclerotiorum* in Germany, 729.
— —, possible use of, against *Ustilago nuda* on barley in Belgium, 280.
— —, toxicity of disinfectants to, 523.
Tricresol, toxicity of, to *Sclerotinia americana*, 229.
Trifolium, see Clover.
Trigonella foenum-graecum, *Peronospora trigonellae* on, in India, 611.
— —, *Uromyces trigonellae* on, in Italy, 660.
Trimethylamine, presence of, in wheat bunt spores, 277.
Triolein, toxicity of, to *Sphaerotheca humuli*, 576.
Triolith, composition and use of, against *Coniophora cerebella* and *Merulius lacrymans*, 262.
Triposporium stapeliae on *Caralluma*, *Davalia*, *Hoodia*, *Huernia*, *Sarcophagophilus*, *Stapelia*, *Tavaresia*, and *Trichocaulon* in S. Africa, 764.
Trissocladius, *Opuntiella digitata* on, in Alpine waters, 512.
Triticum, see Wheat.
Triton marmoratus, *Dermocystidium pusula* on, 171.
Trockenfusariol, determination of mercury in, 306; of mercury on seed-grain treated with, 152.
Tropaeolum, *Bacterium tumefaciens* can infect, 699.
— *majus*, curly top of beet affecting, in U.S.A., 446.
— —, tomato spotted wilt can infect, 730.
Truffles, see *Tuber*.
Trutta fario, *Dermocystidium branchialis* on, 171.
Tryblidiella, similarity of *Diplodia* stages of *Physalospora* and of, 791.
— *hysterina* on *Ilex vomitoria* in U.S.A., 791.
— *leprieuri* on tea in India, 790; *Diplodia* stage of, 790.
— (?) *rufula* on *Melia* in U.S.A., 791.
— — on *Prunus serotina* in U.S.A., 791.
— — on *Rhus* in U.S.A., 790.
Trypaflavin, toxicity of, to fungi, 304.
Tsuga canadensis, *Dermatea balsamea* on, in U.S.A., 131; *Cenangium balsameum* renamed, 131; *Gelatinosporium abietinum* conidial stage of, 131.
— —, *Diaporthe conorum* on, in U.S.A., 132; *Phomopsis occulta* conidial stage of, 132.
— —, *Myxosporium* on, in U.S.A., 131; *Dermatea livida* (?) perfect stage of, 131.
Tuber aestivum, method of detecting, 486; occurrence in Austria, 486; in France, 198.
— *borchii* in Italy, 486.
— *brumale* in France, 198; in Italy, 486.

[*Tuber*] *magnatum* in Italy, 485.
— *melanosporum* and *T. uncinatum* in France, 198.
— *zeylanicum*, *Sclerocystis coremioides* and *Sclerotium rolfsii* not accepted as synonyms of, 248.
(?) *Tuberculina* on poplar in Italy, 63.
— *maxima* parasitizing *Cronartium comptoniae* and *C. ribicola* in N. America, 543.
Tulasnella anceps renamed *Corticium anceps*, 132.
Tulip (*Tulipa*), *Botrytis tulipae* on, in Canada, 96.
—, 'breaking' of, complex nature of, 292; occurrence in England, 633; in U.S.A., 292; relation of, to lily mosaic, 292; transmission of, by *Anuraphis tulipae*, *Macrosiphum gei*, and *Myzus persicae*, 633; types of, 633.
—, *Phytophthora cryptogea* var. *richardiae* on, in England, 140.
Turf, (?) *Calonectria graminicola* on, in England, 754.
—, *Corticium solani* on, in U.S.A., 450.
—. *Sclerotium rhizodes* on, in Canada and U.S.A., 450.
—, snow mould of, non-sclerotial type of, in N. America, 450.
—, see also Grasses.
Turnip (*Brassica campestris*), *Cercosporella albomaculans* on, in Belgium, 677; in U.S.A., 546.
—, horse-radish mosaic can infect, 352.
—, *Plasmodiophora brassicae* on, genetics of resistance to, 670; nature of resistance to, 347; occurrence in Denmark, 608; in Scotland, 6; in Sweden, 670; varietal resistance to, 6, 608, 670.
Turritis glabra, *Plasmodiophora brassicae* on, in Russia, 346.
Tutan, adherence of, to seed-grain, 430.
—, composition of, 306.
—, determination of mercury in, 306; of mercury on seed-grain treated with, 152.
Twisted top of sugar-cane in Réunion, 328.
Tylenchus pratensis on tobacco in U.S.A., 145.
— *tritici* on wheat in Egypt, 749.
Tylophoma sorbi on *Pyrus aucuparia*, conidial formation in, 790; *Dothiora sorbi* renamed, 790.
Typhula graminum, antagonism of, to *Ophiobolus graminis*, 684.
(?) — — on barley in U.S.A., 615.
— — on cereals in U.S.A., 367.
(?) — — on wheat in U.S.A., 615.
— *trifolii* in seed samples of clover in Denmark, 294.
— *variabilis* on beet in Italy and Spain, 416.

Ulmus, see Elm.
Ultra-violet rays, effect of, on bacteria, 461; on *Fusarium* spp., 316; on *Helminthosporium avenae*, 504; on *H. sativum*, 560; on tobacco mosaic virus, 461; on *Trichophyton mentagrophytes*, 509.
Uncinula salicis on *Salix caprea* and other hosts in Sweden, 666.
Unidea, composition and use of, against *Actinomyces scabies* on potato, 321.
Uranium, black oxide of, effect of, on growth of mushrooms in France, 197.
Urea, non-toxicity of, to fungi, 304.
Uredinales, see Rusts.
Uredo on *Andromeda glaucophylla* in U.S.A., 67.
Urocystis cepulae on *Allium fistulosum* in U.S.A., 416.
— — on onion in Russia and U.S.A., 610.
— *occulta* on rye in Russia, 616.
— —, *U. tritici* mistaken for, in Italy, 751.
— *tritici* on wheat, control, 363, 682; factors affecting, 363, 681; mistaken for *U. occulta*, 751; occurrence in Australia, 18; in China, 363; in Italy, 681, 751; studies on, 18, 681; varietal resistance to, 18, 363, 682.
Uromyces appendiculatus on bean, control, 1, 71; effect of narcosis on susceptibility to, 45; nature of resistance to, 415; occurrence in U.S.A., 1, 71, 415.
— *arachidis* synonym of *Puccinia arachidis*, 246.
— *betae* on beet, control, 135; fat formation round uredosori of, 317; occurrence in Austria, 135; in Czecho-Slovakia, 546; in Germany, 317.
— *caladii* on *Arisaema triphyllum* in U.S.A., cytology of, 388.
— *caryophyllinus*, toxicity of sulphur, selenium, and tellurium to, 107.
— *decoratus* on *Crotalaria juncea* and *C. vitatoni* in Japan, 726.
— *ervi* on vetch in Japan, 596.
— *fabae* on bean in Egypt, 749; in Japan, 596.
— — on *Lathyrus maritimus*, *L. palustris* var. *lineaefolius*, peas, and vetch in Japan, 596; physiologic forms of, 596.
— *medicaginis* on lucerne in U.S.A., 177.
— *orobi* on *Lathyrus davidii* and vetch in Japan, 596; physiologic forms of, 596.
— *trigonellae* on *Trigonella foenum-graecum* in Italy, 660.
— *vignae* on cowpea in China, 395; in Cyprus, 747.
Urophlyctis alfalfae on lucerne in U.S.A., 177.
— *leproides* on beet in Italy, 537.
Uspulun, use of, against *Alternaria radicina* on carrot, 72; against *Botrytis tulipae* on tulip, 96; against *Cladosporium cucumerinum* on cucumber, 485; against *C. fulvum* on tomato, 233; against *Corticium solani* on cucumber, 710; on orange, 214; against *Diplodia lycopersici* on tomato, 233; against *Fusarium* on rice, 720; against *F. bulbigenum* on narcissus, 225; against *Plasmodiophora brassicae* on cabbage, 233; on swedes, 710; against *Ramu-*

laria foeniculi on *Foeniculum vulgare*, 245; against *Sclerotinia minor* and *S. sclerotiorum* on lettuce, 485; against *Thielaviopsis basicola* on *Primula obconica*, 514; against wheat bunt, 17.
[Uspulun] dust, use of, against *Gibberella saubinetii* and *Helminthosporium sativum* on wheat, 683; against *Sclerotinia minor* and *S. sclerotiorum* on lettuce, 485; against *Urocystis tritici* on wheat, 363; against wheat bunt, 683.
— -universal, cost of, 152.
— —, determination of mercury in, 305; of mercury on seed-grain treated with, 152.
— —, stimulatory action of, on *Poa pratensis*, 535.
— —, use of, against *Calonectria graminicola* on rye, 84, 152; against *Deuterophoma tracheiphila* on lemon, 214; against *Helminthosporium gramineum* on barley, 84, 152, 162; against *Plasmodiophora brassicae* on cabbage, 493; against *Ustilago avenae* on oats, 84, 152; against wheat bunt, 84, 152, 683.
Ustilaginales, list of, in France, 537; in the tropics, 726; in Uruguay, 193.
— on cereals, control of, in Russia by the use of clean seed, 616; review of work on breeding against, 16.
Ustilago on *Erianthus* and *Saccharum*, 723.
— *avenae* on oats, artificial inoculation with, 431; breeding against, 269; chemical composition of spores of, 584; control, 12, 84, 144, 152, 153, 211, 279, 614, 617, 644; cytology of, 622, 650; effect of, on host, 209, 211; on susceptibility to *Puccinia lolii*, 211; factors affecting, 17, 144, 562, 644, 650; genetics of, 17; of resistance to, 562; hybridization of, with *U. kolleri*, 431, 622; occurrence in Canada, 211; in the Caucasus, 560; in Germany, 84, 152, 209, 279, 650; in Ireland, 211; in Russia, 617; in Tunis, 153; in U.S.A., 12, 144, 269, 431, 614, 622, 644; studies on, 17, 562, 622, 650; varietal resistance to, 269, 562.
— *bromivora* on *Bromus arvensis* in Denmark, 294.
— *bulgarica* on sorghum in Russia, 617.
— *crameri* on *Setaria italica* in Russia, 617.
— *decipiens* on *Arrhenatherum elatius* in Germany, 650.
— *esculenta* on *Zizania aquatica* in China, 724.
— *hordei* on barley, chemical composition of spores of, 584; control, 153, 617, 622; cytology of, 210; factors affecting, 17; genetics of, 17; hybridization of, with *U. nuda*, 280; occurrence in Belgium, 280; in the Caucasus, 560; in Rumania, 549; in Russia, 617; in Tunis, 153; in Western Australia, 622; study on, 280.
— *kolleri* on oats, breeding against, 269; control, 211, 617; cytology of, 622; effect of, on host, 211; on susceptibility to *Puccinia lolii*, 211; factors affecting, 562; genetics of resistance to, 562; histology of, 756; hybridization of, with *U. avenae*, 431, 622; occurrence in Canada, 211; in the Caucasus, 560; in Ireland, 211; in Russia, 617; in U.S.A., 204, 269, 431, 562, 622; in Wales, 756; physiologic forms of, 756; studies on, 562, 622, 756; varietal resistance to, 204, 269, 562.
[*Ustilago*] *longissima*, hybridization in, 88.
— *neglecta* on *Setaria italica* in Russia, 617.
— *nigra* on barley in U.S.A., 161.
— *nuda* on barley, control, 280, 614, 617, 644; effect of X-rays on, 644; hybridization of, with *U. hordei*, 280; occurrence in Belgium, 280; in the Caucasus, 560; in Rumania, 549; in Russia, 617; in U.S.A., 161, 614, 644; in Western Australia, 622; study on, 280.
— (?) *panici-frumentacei* on *Panicum frumentaceum* in Nyasaland, 10.
— *panici-miliacei* on *Panicum miliaceum* in Russia, 616.
— (?) *paradoxa* on *Panicum frumentaceum* in Nyasaland, 10.
— *penniseti* on *Pennisetum typhoideum* in India, 367.
— *perennans* on *Arrhenatherum elatius* in Denmark, 294.
— *raciborskiana* on *Polygonum auberti* in Poland, 550.
— *scitaminea* on sugar-cane in Brazil and (?) British Guiana, 723; in China, 724; (?) in N. America and Trinidad, 723.
— *scorzonerae* on *Scorzonera humilis* in Germany, 88.
— *sorghicola* on sorghum in Russia, 617.
— *treubii* synonym of *Liroa emodensis*, 726.
— *tritici* on wheat, chemical composition of spores of, 584; control, 17, 499, 617, 644; factors affecting, 17, 644; genetics of, 17; of resistance to, 428; occurrence in Austria, 17; in Canada, 428; in the Caucasus, 560; in Germany, 499; in New Zealand, 496; in Rumania, 549; in Russia, 617; in U.S.A., 644; study on, 499; varietal resistance to, 428, 496, 549.
— *utriculosa* on *Polygonum lapathifolium*, *P. pennsylvanicum*, and *P. persicaria*, and contaminating wheat grain in Canada, 277.
— *zeae* on maize, chemical composition of spores of, 584; factors affecting, 17; gall formation by, 563; genetics of, 17; of resistance to, 365; heterothallism of, 88; hybridization in, 88; nature of resistance to, 366; occurrence in Czecho-Slovakia, 563; in Germany, 88; in Russia, 165, 617; in U.S.A., 365; studies on, 88, 365.
Ustulina, formation of black lines in wood by, 544.
— *zonata* on cacao, 207.

Vaccinium corymbosum, *Calyptospora columnaris* on, in U.S.A., 613.

[*Vaccinium*] *macrocarpon* and *V. oxycoccus*, see Cranberry.
— *pennsylvanicum*, *Calyptospora columnaris* on, in U.S.A., 613.
— *uliginosum*, *Thecopsora myrtillina* on, in Japan, 726.
— *vitis-idaea*, *Thecopsora vacciniorum* on, in Japan, 726.
Valsa on stone fruits in Hungary, 575.
— *japonica*, note on, 603.
— *mali*, note on, 603.
— *nivea* on cottonwood, (?) pecan, and poplar in U.S.A., 270.
— *paulowniae* on *Paulownia tomentosa* in Japan, 603.
— *sordida*, see *Cytospora chrysosperma*.
Vangueria infausta and *V. pygmaea*, *Hemileia* on, in S. Africa, 169.
Vanilla (*Vanilla planifolia*), *Fusarium batatatis vanillae* on, in Porto Rico, 246.
Variation in *Botrytis cinerea*, nature of, 316; in *Pestalozzia funerea*, 332.
—, see also Saltation.
Variegation, infectious, of *Abutilon mulleri* and *A. thompsoni* in U.S.A., 375.
—, —, of the apple in U.S.A., 636.
Vaseline, use of, against main stalk rot of banana in storage, 106.
Vaucheria, *Rosellinia necatrix* can infect, 307.
Vegetable marrow (*Cucurbita pepo*), beet curly top virus can infect, 447.
— —, *Fusarium javanicum* var. *theobromae* on, in S. Africa, 197.
Vegetables, diseases of, in England, 346; in U.S.A., 71.
Veinbanding of tobacco, note on, 205; occurrence in Rumania, 580; in U.S.A., 205, 588; properties of virus of, 588; relation of, to potato crinkle A, 588; to potato rugose mosaic, 588; to potato virus A, 717; to potato virus Y, 717; transmission of, by *Macrosiphum gei* and *Myzus persicae*, 588; by sap, 588; from potato, 588; to *Nicandra physaloides*, *Nicotiana glutinosa*, *N. rustica*, *Physalis pubescens*, *Solanum nigrum*, and tomato, 588; virus of, on potato in Holland, 589; in U.S.A., 205, 588.
Venturia chlorospora on *Salix* in U.S.A., 251, 355.
— *crataegi* on *Pyracantha coccinea* in U.S.A., 205.
— *inaequalis* on alpine plants (stigmata) in Italy, 449.
— — on apple, ascospore discharge of, 32, 225, 296, 612, 746; control, 8, 12, 28, 31, 100, 101, 102, 204, 225, 268, 296, 297, 376, 450, 451, 452, 487, 572, 612, 613, 614, 637, 678, 709, 766, 774; development of, in storage, 8, 32, 376; dissemination of, 179; factors affecting, 31, 178, 225, 746; 'Geneva system' of evaluating treatments against, 638; germination of, 268; notes on, 766; occurrence in Canada, 296, 678; in England, 100, 101, 297, 452, 487, 766, 774; in Germany, 31, 297, 377, 746, 766; in New Zealand, 296; in Switzerland, 8, 178, 377, 450; in Tasmania, 28, 32; in U.S.A., 12, 28, 30, 100, 102, 204, 225, 451, 572, 612, 613, 614, 637, 709; pin-head form of, 678; spray warnings against, in Canada, 296; in U.S.A., 102; stock influence on susceptibility to, 298; studies on, 178, 296, 637; varietal resistance to, 225; viability of, 179.
[*Venturia*] *pirina* on pear, ascospore discharge in, 296, 300, 746; control, 300, 451, 453, 639, 767, 774; estimation of intensity of infection by, 767; factors affecting, 746; occurrence in England, 453, 488, 639, 767, 774; in Germany, 746; in New Zealand, 296; in Switzerland, 451; in U.S.A., 300; stock influence on susceptibility to, 639; study on, 296; varietal susceptibility to, 300.
Vermicularia on elm in U.S.A., 124.
Veronica allionii, mycorrhiza of, in Italy, 309.
— *americana*, *Sorosphaera veronicae* on, in U.S.A., 468; synonymy of, 469.
— *chamaedrys*, *V. fruticulosa*, *V. officinalis*, and *V. praecox*, mycorrhiza of, in Italy, 309.
— *urticaefolia*, *Botrytis cinerea* on, in Italy, 449.
Verticillium on *Acer campestre* in Italy, 337.
— on *Acer platanoides* and apricot in Italy, 338.
— on banana, 39; in Australia, 40; in Sierra Leone, 552.
— on *Chimonanthus fragrans* in Italy, 338.
— on cotton in Queensland, 200.
— on elm in U.S.A., 404.
— on *Euphorbia*, *Fatsia japonica*, *Koelreuteria paniculata*, and *Lonicera biflora* in Italy, 338.
— on mushrooms in England, 72.
— on *Papaver rhoeas* and phlox in Italy, 338.
— on potato in Austria, 187.
— on strawberry in England, 139.
— *albo-atrum*, absence of biologic specialization in, 117.
— — can infect chilli, cotton, and *Physalis alkekengi*, 117; eggplant, potato, and tomato, 470.
— —, factors affecting, 117, 470.
— — on *Acer campestre* in Italy, 734.
— — on *Acer negundo* in Germany, 117.
— — on ash in Holland, 665.
— — on banana, 39.
— — on cherry and *Chrysanthemum morifolium* in Germany, 117.
— — on cotton, 566; in U.S.A., 92; study on, 93.
— — on currants in Germany, 117.
— — on eggplant, control, 494; factors affecting, 494; notes on, 117; occurrence in U.S.A., 117, 494.
— — on elm, notes on, 117; occurrence (?) in England, 334; in Germany, 117; in U.S.A., 125.
— — on gooseberry, horse-chestnut, and lime trees in Germany, 117.

[*Verticillium albo-atrum*] on *Papaver bracteatum* in Germany, 117.
— — on plum, notes on, 117; occurrence in Belgium, 8, 677; in Germany, 117.
— — on potato in New Zealand, 403, 719; study on, 719.
— — on *Robinia pseud-acacia* in Holland, 665.
— — on shrubs and trees in Holland, 665.
— — on tomato, control, 403; factors affecting, 117; notes on, 117, 403, 470; occurrence in Germany, 117; in New Zealand, 403, 719; strains of, 719; study on, 719.
— —, pathogenicity studies on, 117, 470.
— — var. *caespitosum* on potato in Germany, 117.
— — var. *medium* on banana (imported) in Germany, 117.
— (?) *candelabrum* on banana from the Canaries, 39.
— *cinerescens* on China aster in Germany, 633.
— *cinnamomum* on loquat in Portugal, 726.
— *dahliae* can infect almond, peach, and plum, 76; *Antirrhinum majus*, blackberry, cotton, eggplant, *Hibiscus esculentus*, raspberry, *Rhus typhina*, and rose, 470.
— —, factors affecting, 470.
— — on apricot in France, 76.
— — on currants in England, 488; in Holland, 705; 'Bangert' disease and 'oedema' attributed to, 705.
— — on dahlia in Austria, 26.
— — on lupin, pear, and quince in England, 488.
— — on raspberry in Holland, 705.
— — on sunflower in Russia, 571.
— —, pathogenicity studies on, 470.
— (?) *ovatum* on rose in Canada, 447.
— — on tomato in U.S.A., 249.
Vetch (*Vicia* spp.), *Cercospora* (?) *fabae* on, in Cyprus, 747.
—, *Fusarium orthoceras* var. *pisi* on, in U.S.A., 71.
—, *Ophiobolus graminis* can infect, 19.
—, *Uromyces ervi*, *U. fabae*, and *U. orobi* on, in Japan, 596.
Vicia spp., see Vetch.
— *faba*, see Bean.
Vigna, *Ascochyta* and *Colletotrichum* on, in Uganda, 422.
— *catjang* and *V. sinensis*, see Cowpea.
Vinca rosea, beet curly top virus can infect, 447.
— —, rosette of, in Sierra Leone, 202.
Vine (*Vitis*), *Alternaria vitis* on, in Rumania, 486.
—, *Botrytis cinerea* on, in U.S.A., 103.
—, brunissure of, in France, 676.
—, *Cercospora viticola* on, in China, 395.
— chlorosis in France, 745.
—, *Coniothyrium diplodiella* on, in Rumania, 486; in Switzerland, 8.
—, court-noué of, legislation against, in Portugal, 672. (See also leaf roll of.)
[Vine], *Diplodia viticola* on, in Rumania, 486.
—, flavescence of, see rougeau of.
—, *Fusarium* on, in Italy, 745.
—, *Gloeosporium ampelophagum* on, control, 6, 265; *Elsinoe ampelina* perfect stage of, 596; occurrence in China, 395; in Madagascar, 675; in New S. Wales, 265; in S. Africa, 6; term anthracnose first applied to, 595; varietal resistance to, 6.
—, Hymenomycete on, in Spain, 354.
—, leaf discoloration (nutritional) of, in Germany, 353.
—, — roll of, in Italy, 418; relation of, to mosaic, 419. (See also court-noué of.)
—, little leaf of, in U.S.A., 99.
—, *Macrophoma sicula* and *Monochaetia uniseta* on, in China, 395.
— mosaic in Czecho-Slovakia and Italy, 419; relation of, to leaf roll, 419.
—, obscure disease of, in Italy, 200.
—, *Phoma cookei* on, in China, 395.
—, — *flaccida* on, control, 420; factors affecting, 353; note on, 486; occurrence in Algeria, 352; in France, 420; in Rumania, 486; study on, 420; varietal susceptibility to, 353.
—, — *viticola* on, in China, 395.
—, *Physalospora baccae* on, in Rumania, 486.
—, — *cydoniae* on, in Tunis, 487.
—, *Plasmopara viticola* on, breeding against, 548; control, 8, 72, 73, 74, 138, 139, 198, 199, 200, 352, 419, 420, 674; effect of flavescence on resistance to, 675; factors affecting, 8, 72, 198, 265, 352; forecasting attacks of, 72, 73; losses caused by, 199, 265; notes on, 72, 419, 578; occurrence in Algeria, 198; in France, 72, 73, 74, 75, 138, 198, 199, 200, 265, 352, 419, 420, 578, 674, 675; in Germany, 74, 548; in Italy, 73, 199; in Sierra Leone, 553; in Switzerland, 8, 314, 548; overwintering of, 138; phenology of, 73; sap buffer content in relation to, 314; use of, in fungicidal tests, 577; varietal susceptibility to, 73, 548.
—, *Pseudopeziza tracheiphila* on, in Switzerland, 314.
—, rougeau of, control, 487; etiology of, 675; factors affecting, 200, 487; 'flavescence' and 'rougeat' forms of, 487; occurrence in Algeria, 200; in France, 200, 675; in Tunis, 200, 487; studies on, 487, 675; varietal susceptibility to, 200, 487, 675.
—, *Sclerotinia fuckeliana* on, in Rumania, 549.
—, *Sordaria uvicola* on, in Rumania, 486.
—, *Sphaceloma ampelina* on, see *Gloeosporium ampelophagum* on.
—, *Stereum* on, in Spain, 354.
—, — *necator* on, in Rumania, 486.
—, *Trichothecium candidum* on, in Rumania, 487.
—, virus causing premature senility in, in Italy, 419.
—, wilting of, in Italy, 745.

Viola tricolor, see Pansy.
Violet (*Viola*), mycorrhiza of, in Italy, 309.
—, *Puccinia violae* on, in U.S.A., cytology of, 388.
—, *Sphaceloma* on, in U.S.A., 449.
Virginia creeper (*Parthenocissus tricuspidata*), *Colletotrichum ampelinum* var. *parthenocissi* on, in China, 725.
Virus disease (infectious variegation) of *Abutilon mulleri* and *A. thompsoni* in U.S.A., 375.
— — of apple in U.S.A., 455.
— — of barley in Siberia, 307.
— — of chilli in Spain, 354.
— — of *Datura stramonium* in U.S.A., 79; relation of, to tomato streak, 79.
— — of delphinium in U.S.A., 473; host range of, 474.
— — of maize in Siberia, 307.
— — of oats in Siberia, 306; transmissible to barley, maize, *Panicum miliaceum*, rye, soy-bean, and wheat, 307.
— — of *Panicum miliaceum* in Siberia, 307.
— — of peach in U.S.A., 206, 454.
(?) — — of *Pelargonium zonale* in England, 223.
— — of plum in Bulgaria, 600; in U.S.A., 205, 454; study on, 454.
— — — — (plum pox) (?) in Australia, 230; in Bulgaria, 229; in (?) Holland, (?) S. Africa, and (?) U.S.A., 230; *Lecanium corni* in relation to, 230.
— — (new) of potato in U.S.A., 388; can infect *Datura stramonium*, tobacco, and tomato, 388.
— — of rose in U.S.A., 455.
— — of rye in Siberia, 307.
— — of soy-bean in Siberia, 307.
— — of tobacco in U.S.A., 474; can infect cucumber, delphinium, and tomato, 474.
— — of vine in Italy, associated with premature senility, 419.
— — of wheat in Siberia, 307.
— diseases of cucumber in Germany, 477.
— — of plants, see Plant virus diseases.
— — of potato, comparative study of American and European, 47; control, 7, 49, 50, 188, 236, 496, 615, 677; degeneration attributed to, 783; effect of, on yield, 716; notes on a new, 388; occurrence in Belgium, 585; in Ireland, 7; (?) in Italy, 321; in Poland, 716; in Switzerland, 677, 783; in U.S.A., 188, 388, 496, 612, 615; in Wales, 236; production of seed free from, 7, 49, 50, 236, 677; tests of certified seed against, 585; transmission of, by *Macrosiphum gei*, 612; by *Myzus persicae*, 236; tuber indexing and uniting against, 49, 50, 615; varietal resistance to, 716. (See also Degeneration of.)
— — of raspberry in U.S.A., 357, 641.
— — of tobacco in Rumania, 791; in U.S.A., 474; pathological modifications caused by, 476.
[Virus diseases] of tomato in Germany, 477.
— —, see also Chlorosis, infectious; Mosaic, &c.
— -like disease of potato in U.S.A. attributed to *Tarsonemus*, 784.
Viruses, inability of, to enter unbroken cells, 140.
—, nature of, 140.
—, size of particles of, 140, 308, 646.
Vitis, see Vine.
— *cordifolia*, *Gloeodes pomigena* on, in U.S.A., 206.
— *gongyloides*, phloem necrosis (induced) in, 43.
Vitrioline, use of, against *Gibberella saubinetii* and *Helminthosporium* on, and bunt of, wheat, 683.
Volutella buxi renamed *Chaetodochium buxi*, 634.
— *rusci*, *Chaetodochium rusci* distinct from, 634.
Vomasol C and S, use of, against *Gloeosporium amygdalinum* on almond, 380.

W 3, use of, against *Penicillium digitatum* on oranges, 759.
Wallflower (*Cheiranthus cheiri*), *Plasmodiophora brassicae* on, in Denmark, 608.
Walnut (*Juglans*), bacterial disease of, in U.S.A., 601.
—, *Bacterium juglandis* on, control, 182, 338; dissemination of, 338; factors affecting, 253, 338, 339; notes on, 271, 339; occurrence in France, 253; (?) in Italy, 339; in Tasmania, 271; in U.S.A., 182, 338; overwintering of, 338; studies on, 253, 338; varietal susceptibility to, 253.
—, *Cytospora* on, in U.S.A., 270.
—, (?) *Gnomonia leptostyla* on, in U.S.A., 251.
—, little leaf of, in U.S.A., 99.
—, *Nectria* and *N.* (?) *galligena* on, in U.S.A., 424.
—, physiological disorder of grafted, in U.S.A., 601.
— yellows in U.S.A., 542.
Waste pulp liquor as a wetting agent, 182.
Water, *Fusarium aquaeductum* and *Leptomitus lacteus* in, in England and Ireland, 58.
—, *Phoma hibernica* in, in Irish Free State, 24.
Water spot of orange in U.S.A., 690.
Watercress (*Nasturtium officinale*), *Cercospora nasturtii* on, in U.S.A., 546.
Water-gas tar, use of, as timber preservative, 670.
Watermelon (*Citrullus vulgaris*), *Colletotrichum lagenarium* on, in France, 418; synonymy of, 418.
—, *Cribropeltis citrullina* on, in U.S.A., 788.
—, *Diplodia tubericola* can infect, 366.
—, *Fusarium* on, in S. Australia, 142.
—, — *niveum* on, breeding against, 424; dissociation in, 423; factors affecting,

197; notes on, 744; occurrence in Italy, 338; in U.S.A., 197, 423, 495, 744; study on, 197; toxic action of, 423; varietal resistance to, 423, 495.
[Watermelon], *Gloeosporium lagenarium* on, see *Colletotrichum lagenarium* on.
—, *Physalospora rhodina* and *P. zeicola* can infect, 366.
Waterproof mixture, use of, against decay of stock snag of *Hevea* rubber, 591.
Wax, tree, use of, as a wound dressing, 417.
Weizenfusarol, composition of, 305.
—, determination of mercury in, 305; of mercury on seed-grain treated with, 152.
Wettable sulphur, see Sulphur, wettable.
Wetting capacity of sprays, estimation of, 139.
Wheat (*Triticum*), *Alternaria tenuis* on, in Siberia, 160.
—, *Bacterium atrofaciens* on, in New S. Wales, 430; in U.S.A., 431.
—, — *translucens* var. *undulosum* on, effect of, on yield, 13; occurrence in Belgium, 7; in Kenya, 9, 13.
—, black germ of, in Siberia, 160; 'moucheture' and 'puntatura' similar to, 160.
—, *Calonectria graminicola* on, in England, 754; in Germany, 158.
—, *Cercosporella herpotrichoides* on, control, 560; factors affecting, 430, 560; occurrence in France, 75, 560; in Germany, 502; in U.S.A., 430; study on, 502.
—, *Claviceps purpurea* on, in France, 275.
—, *Corticium solani* on, in S. Australia, 159.
—, effect of excretions of *Aspergillus niger*, *Botrytis cinerea*, *Cephalosporium*, and other soil fungi on growth of, 85; of leaf recision on development of, 751, 753.
—, *Erysiphe graminis* on, factors affecting, 620; genetics of resistance to, 78; nature of resistance to, 620; occurrence in Germany, 620; in New Zealand, 496; in U.S.A., 78, 362; physiologic forms of, 78, 362; study on, 620; varietal susceptibility to, 78, 362.
—, fungi in kernels and roots of, methods of isolating, 363.
—, fungus causing lodging of, in Germany, 158.
—, *Fusarium* on, effect of, on viability of grain, 160; factors affecting, 157; grasses as hosts of, 621; occurrence in Germany, 150, 157; in Siberia, 160.
—, — *culmorum* on, factors affecting, 502, 684; loss of virulence of, 684; mixed inoculations with, 684; occurrence in Canada, 502, 684; in Germany, 158.
—, — *herbarum* on, in Germany, 278.
—, *Gibberella saubinetii* on, control, 683; factors affecting, 278, 620; method of infection by, 159, 621; occurrence in the Argentine, 683; in Belgium, 676; in Canada, 621; in New Zealand, 496; in U.S.A., 159, 620; studies on, 159, 620.
[Wheat], grey speck of, in Sweden, 19.
—, *Helminthosporium* on, in France, 275.
—, — *sativum* on, control, 161, 683; factors affecting, 161, 683, 684; grasses as hosts of, 621; loss of virulence of, 684; methods of inoculating, 561; mixed inoculations with, 684; occurrence in the Argentine, 683; in Canada, 561, 621, 684; in Kenya, 9; in Siberia, 160; studies on, 160, 561.
—, *Lagena radicicola* on, in Canada, 749; two forms of, 750.
—, *Leptosphaeria herpotrichoides* on, control, 157, 279; factors affecting, 157, 279; loss of virulence of, 684; mixed inoculations with, 684; note on, 19; occurrence in Germany, 150, 157, 279.
— mosaic in Egypt, 749.
—, 'moucheture' of, similarity to black germ of, in Siberia, 160.
—, mycorrhiza of, in Italy, 310, 312.
—, *Ophiobolus graminis* on, antagonism of other fungi to, 18, 19, 684; control, 19, 156, 210, 279; effect of, on yield, 13; factors affecting, 18, 19, 157, 210, 279, 622, 683, 684; grasses as hosts of, 621; losses caused by, 683; loss of virulence of, 684; occurrence in the Argentine, 683; in Canada, 18, 621, 684; in France, 75; in Germany, 19, 156, 157, 210, 279; in Kenya, 13; in New Zealand, 496; in U.S.A., 18; studies on, 18, 19; toxic action of, 315.
—, — *herpotrichus* on, control, 279; factors affecting, 157, 158, 210, 279; notes on, 19; occurrence in Germany, 19, 150, 157, 158, 210, 279.
—, *Polymyxa graminis* on, in Canada, 358.
—, pseudo-black chaff of, in Canada, 561.
—, *Pseudomonas tritici* on, in Egypt, 749.
—, *Puccinia* on, chemical composition of spores of, 585; factors affecting, 498; injury caused by, estimation of, 752; losses caused by, 150, 359, 750; occurrence in Bulgaria, 150; in Italy, 498; in Poland and Rumania, 150; in S. Africa, 750; overwintering of, 498.
—, — *glumarum* on, breeding against, 13, 208, 360; control by fungicides, 151, 271; differential varieties for forms of, 272; effect of bunt infection on susceptibility to, 276; epidemiology of, 83; factors affecting, 84, 150, 490, 556; fat formation in cells induced by, 317; genetics of resistance to, 209, 360; germination of uredospores of, 556; grass hosts of, 273; mutation in, 273; occurrence in the Argentine, 683; in Canada, 83; in Czecho-Slovakia, 360; in France, 75, 150, 275, 276, 489; in Germany, 149, 208, 272, 273, 556, 557; in Hungary,

359; in Jugo-Slavia, 359; in Kenya, 13; in Rumania, 549; in Tunis, 151, 271; in U.S.A., 84; overwintering of, 489; physiologic forms of, 272, 273, 557; reaction towards, as a differential character, 558; studies on, 83, 150, 208, 272, 360, 556, 557; variation in resistance to, 150; varietal resistance to, 150, 209, 272, 275, 360, 557.

[Wheat, *Puccinia*] *graminis* on, breeding against, 17; causing asthma in man, 174; control, 203, 271, 359, 427, 681; by dusting, 271; effect of amputation of roots on susceptibility to, 501; of, on yield, 149, 361; of sowing date on, 490, 681; epidemiology of, 359, 360, 427, 550, 556, 681; factors affecting, 14, 15, 75, 359, 497, 498, 681, 750; genetics of resistance to, 13, 14, 750; germination of teleutospores of, 497; grass hosts of, 274; hybridization of, with *P. g. agrostidis*, 208; with *P. g. secalis*, 87, 208; losses caused by, 203, 359, 426, 681; notes on, 492; occurrence in the Argentine, 683; in the Balkans, 359; in Bulgaria, 359, 681; in Canada, 14, 174, 208, 750; in France, 75, 275, 489; in Germany, 149, 273, 359; in Hungary, 359; in Italy, 492, 497, 498; in Jugo-Slavia, 359; in Kenya, 9, 13; in Macedonia, 359; in New S. Wales, 361; in New Zealand, 496; in Poland, 359, 550; in Queensland, 271; in Rumania, 359, 426, 549; in S. Australia, 619; in Tunis, 271; in Turkey, 359; in U.S.A., 14, 17, 87, 203, 360, 427, 556; overwintering of, 497; phenology of, 359, 360, 497; physiologic forms of, 9, 13, 14, 208, 273, 427, 556, 750; rate of fall of spores of, 498; reaction of seedlings to, 750; studies on, 14, 208, 360, 427, 497, 556, 750; varietal resistance to, 9, 17, 271, 275, 361, 426, 490, 497, 619, 681, 750; viability of teleutospores of, 15.

—, — *triticina* on, breeding against, 13, 78; control, 681; by fungicides, 151, 271; effect of date of sowing on, 490, 681; of, on growth, 427; of, on physiology of host, 427, 681; on yield, 359, 361; factors affecting, 206, 274, 490, 681; genetics of resistance to, 208; grass hosts of, 273; losses caused by, 681; occurrence in the Argentine, 683; in Austria, 16; in Bulgaria, 359, 681; in Finland, 619; in France, 75, 150, 489; in Germany, 15, 149, 208, 273, 274, 619; in Greece, 619; in Hungary, 359; in Italy, 497; in Kenya, 13; in New S. Wales, 361; in New Zealand, 496; in Queensland, 271; in Rumania, 426, 549, 619; in Sweden, 619; in Tunis, 151, 271; in U.S.A., 78, 151, 206; osmotic force of spores of, 15; phenology of, 497, 681; physiologic forms of, 13, 15, 78, 151, 273, 426, 549, 619; rate of fall of spores of, 498; studies on, 15, 151, 274, 361, 497; variation in resistance to, 150; varietal resistance to, 13, 75, 78, 206, 271, 361, 426, 427, 681; viability of uredospores of, 16.

[Wheat], 'puntatura' of, similarity to black germ of, in Siberia, 160.

— root diseases, amputation of roots in relation to, 501.

— rosette in Egypt, 749.

—, *Sclerospora macrospora* on, in Italy, 537.

—, *Tilletia caries* on, basidial apparatus of, 777; breeding against, 18, 204; chemical composition of spores of, 277, 585; control, 16, 17, 84, 152, 153, 155, 161, 279, 492, 496, 558, 560, 616, 682, 683; damages for negligence in control of, 161; effect of date of sowing on, 429, 558; of, on host, 209, 276, 558; on susceptibility to *Puccinia glumarum*, 276; on yield, 156; of host on virulence of, 153; estimation of degree of infection by, 154; factors affecting, 155, 429, 492, 558, 560; genetics of resistance to, 84, 85, 428; homo- and heterothallic stages of, 777; hybridization of, with *T. foetens*, 277; method of inoculation with, 777; occurrence in the Argentine, 682; in Australia, 275; in Austria, 16, 17, 153; in Canada, 428, 751, 777; in the Caucasus, 560; in France, 276, 277, 429, 558, 682; in Germany, 84, 152, 161, 209, 279; in Italy, 209, 558; in Lithuania, 492; in New S. Wales, 85; in New Zealand, 496; in Russia, 616; in Siberia, 154, 155; (?) in Sweden, 618; in U.S.A., 18, 84, 155, 156, 204, 275, 277, 428, 618; overwintering of, 751; physiologic forms of, 17, 155, 156, 204, 428, 618, 682; relation of, to speltoid character, 618; strains of, 429; studies on, 84, 85, 154, 276, 428, 492, 558, 618, 777; varietal resistance to, 17, 85, 156, 204, 275, 428, 429, 492, 618.

—, — *foetens* on, breeding against, 18, 204; control, 16, 17, 84, 152, 153, 161, 279, 496, 558, 559, 560, 616, 644, 683; damages for negligence in control of, 161; effect of, on host, 209, 558; of host on virulence of, 154; of sowing date on, 424, 429, 558, 559; of X-rays on, 644; estimation of the degree of infection by, 154; factors affecting, 424, 429, 558, 559, 560; genetics of resistance to, 428, 500; hybridization of, with *T. caries*, 277; method of inoculating with, 777; occurrence in the Argentine, 682; in Australia, 275; in Austria, 16, 17, 682; in Canada, 428; in the Caucasus, 559, 560; in France, 277, 558; in Germany, 84, 152, 161, 279; in Italy, 209, 558; in New Zealand, 496; in Russia, 616; in Siberia, 154; in Tunis, 153; in U.S.A., 18, 154, 204, 275, 277, 424, 429, 500, 617, 644; physiologic forms of, 17, 156, 204, 429, 618, 682; soil infection by, 429; studies on, 154, 428, 500, 558, 618; trimethylamine in spores of, 277; varietal resistance to, 17, 204, 275, 428, 429, 559, 618; viability of, 424.

[Wheat], *Tylenchus tritici* on, in Egypt, 749.
—, (?) *Typhula graminum* on, in U.S.A., 615.
—, *Urocystis tritici* on, control, 363, 682; factors affecting, 363, 681; mistaken for *U. occulta*, 751; occurrence in Australia, 18; in China, 363; in Italy, 681, 751; studies on, 18, 681; varietal resistance to, 18, 363, 682.
—, *Ustilago tritici* on, chemical composition of spores of, 584; control, 17, 499, 617, 644; factors affecting, 17, 644; genetics of, 17; of resistance to, 428; occurrence in Austria, 17; in Canada, 428; in the Caucasus, 560; in Germany, 499; in New Zealand, 496; in Rumania, 549; in Russia, 617; in U.S.A., 644; study on, 499; varietal susceptibility to, 428, 496, 549.
—, — *utriculosa* contaminating grain of, in Canada, 277.
—, virus disease of, in Siberia, 307.
—, *Wojnowicia graminis* on, 19; in France and Morocco, 685.
White lead, use of, as a wound dressing for tea, 597.
— stippling of lucerne in Germany, 765.
— striping of sugar-cane in the Argentine, a genetic mutation, 786.
Whitefly, see Aleyrodidae.
'Whitewash' of broad bean and chilli in Spain, 354.
'Wilding' (witches' broom) of potato in Scotland, 48.
Willow, see *Salix*.
Wilt of elms in U.S.A., 124.
— of pineapple in Hawaii, 520; transmission of, by *Pseudococcus brevipes*, 520.
— of plum in Italy, 769.
— of sugar-cane ('rajoengan') in Java, 593.
— of vine in Italy, 745.
'Wisa' disease of birch in Scandinavia, 253.
Witches' broom of *Daphniphyllum macropodium* in Italy, 375.
— — of delphinium in U.S.A., 449.
— — of potato in U.S.A., 48; 'wilding' of, in Scotland identical with, 48.
— — of spruce in Germany, 409, 664.
— — of tea in Ceylon, 597.
— — of woody plants, studies on, 663.
Withering of the tips of coffee in Eritrea, 746.
Wojnowicia graminis, antagonism of, to *Ophiobolus graminis*, 684.
— — on cereals, notes on, 685; occurrence in France, 157, 685; in Morocco, 685; phenology of, 157.
— — on wheat, note on, 19; occurrence in France and Morocco, 685.
Wood pulp, see under Timber.
— rots of tea in Ceylon, 597.
— wool, trial of, as packing for apples, 703.
Wood's rays, use of, for diagnosis of *Achorion schoenleini*, *Microsporon audouini*, and *M. lanosum*, 23.
Wool, (?) *Aspergillus niger* on, and mildew of, in U.S.A., 24.
Wound callus knots on apple in U.S.A., 637.

X-rays, effect of, on *Bacterium tumefaciens*, 680; on *Botrytis cinerea*, 184, 185; on *Cephalosporium acremonium*, 644; on *Diplodia zeae*, 644; on *Gibberella moniliformis* and *G. saubinetii*, 644; on *Pythium de Baryanum*, 186; on *Tilletia foetens*, *Ustilago avenae*, *U. nuda*, and *U. tritici*, 644.
X virus of potato, 42, 582, 587, 648; G and L types of, on tobacco, 581; protective inoculations against, 582.
Xanthoxylum americanum, *Gloeodes pomigena* on, in U.S.A., 206.
Xylaria polymorpha, formation of black lines by, in timber, 544.
— — on apple in U.S.A., 100.
— *vaporaria* in mushroom beds in England, 72.

Y virus of potato, 42, 582, 587, 648, 717; relation of, to potato crinkle, 717; to potato leaf-drop streak, 717; to tobacco veinbanding, 717; transmission of, by *Myzus persicae*, 648.
Yeasts on butter in U.S.A., 695.
— on citrus in Sierra Leone, 553.
— on prunes (dried) in U.S.A., 379.
Yellow dwarf of onion in U.S.A., 269; can infect *Narcissus*, 269.
— — of potato in U.S.A., 48, 187.
— edge of strawberry in England, 519, 772; *Tarsonemus fragariae* in relation to, 519, 772.
— leaf of apple in U.S.A. attributed to spray injury, 29.
— — spot of banana in Queensland, 458.
— ring spot of dahlia in U.S.A., 697.
— spot of pineapple in Hawaii, 304; transmission of, by *Thrips tabaci*, 304.
— top of potato in U.S.A., 48.
Yellowing of bean (non-parasitic) in U.S.A., 496.
— of coffee in Kenya, dying-off of, in Portuguese W. Africa identical with, 761.
— of sugar-cane in India attributed to nitrogen deficiency, 535.
Yellows of aster (China) in U.S.A., 136; transmission of, by *Cicadula sexnotata*, 136, 446; types of, 136. (See also Yellows of carrot, celery, *Helichrysum bracteatum* and *Zinnia elegans*.)
— of carrot in U.S.A., 136. (See also Yellows of aster.)
— of celery in U.S.A., 136. (See also Yellows of aster.)
— of *Helichrysum bracteatum* in U.S.A., 446. (See also Yellows of aster.)
— of peach, note on, 203; occurrence in U.S.A., 203, 454, 518; transmission of, by *Macropsis trimaculata*, 518.
— of tea (sulphur deficiency) in Nyasaland, 537; (?) in Tanganyika, 201.
— of walnut in U.S.A., 542.

[Yellows] of *Zinnia elegans* in U.S.A., 446. (See also Yellows of aster.)
Yucca filamentosa, *Coniothyrium concentricum* on, in Rumania, 550.

Zantedeschia aethiopica, *Phytophthora richardiae* on, in U.S.A., 26.
Zea mays, see Maize.
Zelkova serrata, *Ceratostomella ulmi* on, in Holland, 665.
Zieria smithii, mycorrhiza of, in New S. Wales, 311.
Zinc acetate, toxicity of, to *Mucor*, 693.
— chloride, estimation of, in treated timber, 133.
— —, use of, against *Bacillus amylovorus* on pear, 357 ; against *Coniophora cerebella* and *Merulius lacrymans* on reed fillings for walls, 262; against pecan rosette, 339, 602 ; as a timber preservative, 1, 70, 123, 670, 740.
— sulphate injury to chrysanthemums in England, 524.
— —, toxicity of, to *Mucor*, 693.
— —, use of, (?) against *Bacterium pruni* on peach, 145 ; against little leaf of apple, cherry, and peach, 205 ; against little leaf of fruit trees, 99 ; against little leaf of plum, 434 ; against mottle leaf of lemon and orange, 434 ; against pecan rosette, 339, 602 ; against *Phytophthora citrophthora* on citrus, 691 ; against *Sclerotinia americana* on peach, 145.
Zingiber officinale, see Ginger.
Zinnia, tomato spotted wilt virus can infect, 59.
— *elegans*, curly top of beet affecting, in U.S.A., 446.
— —, kroepoek (leaf curl) of, in Java, 474.
— —, yellows of, in U.S.A., 446. (See also Aster yellows.)
Zizania aquatica, *Ustilago esculenta* on, in China, 724.
Zizyphus rotundifolia, *Mitteriella zizyphina* on, in India, 395.
— *sativa*, *Phakopsora zizyphi-vulgaris* on, in China, 396.
Zostera marina, dying-off of, factors affecting, 712 ; occurrence in Canada, 308, 646, 712 ; in England, 712 ; in France, 308, 711 ; in Holland, 308, 712 ; in Portugal, 712 ; in U.S.A., 308, 646, 712 ; stated to be a bacterial disease, 308, 711.
Zygodesmus in soil in Czecho-Slovakia, 535.
Zythia versoniana on pomegranate in China and Italy, 641 ; *Nectriella versoniana* (?) perfect stage of, 642.

PRINTED IN
GREAT BRITAIN
AT THE
UNIVERSITY PRESS
OXFORD
BY
JOHN JOHNSON
PRINTER
TO THE
UNIVERSITY